THE NATIONAL GEOGRAPHIC MAGAZINE

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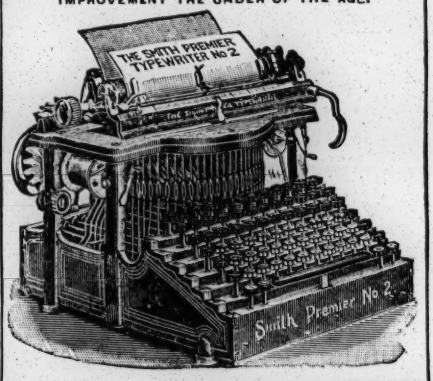

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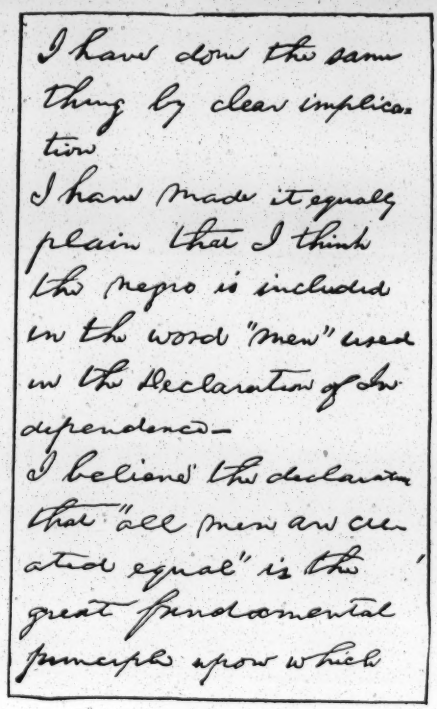

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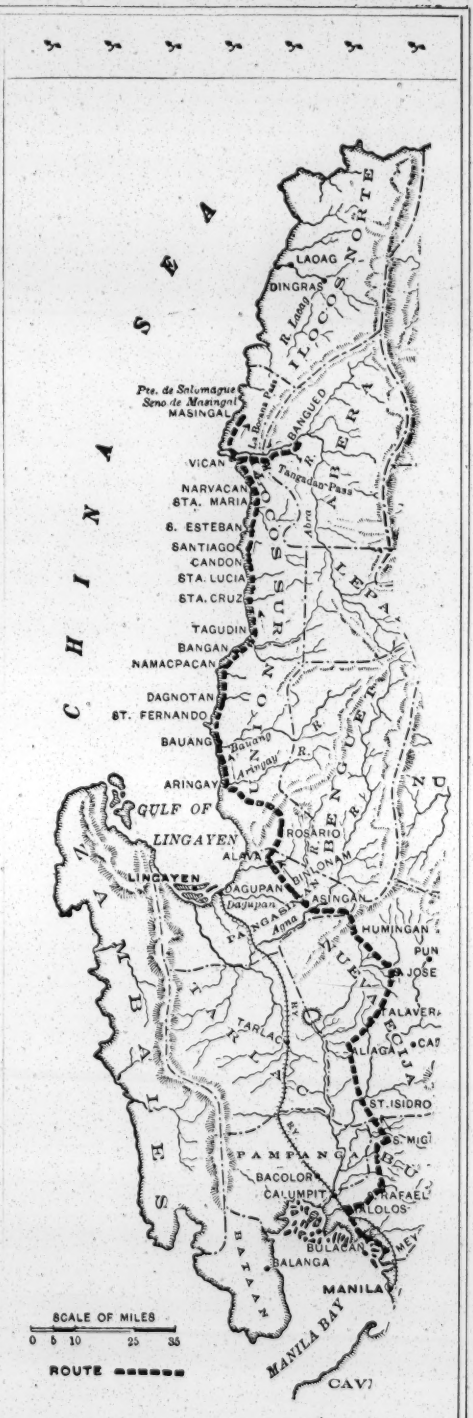


Map Showing Route Traversed by Mr. Sonnichsen

VOL. XII, No. 4 WASHINGTON APRIL, 1901

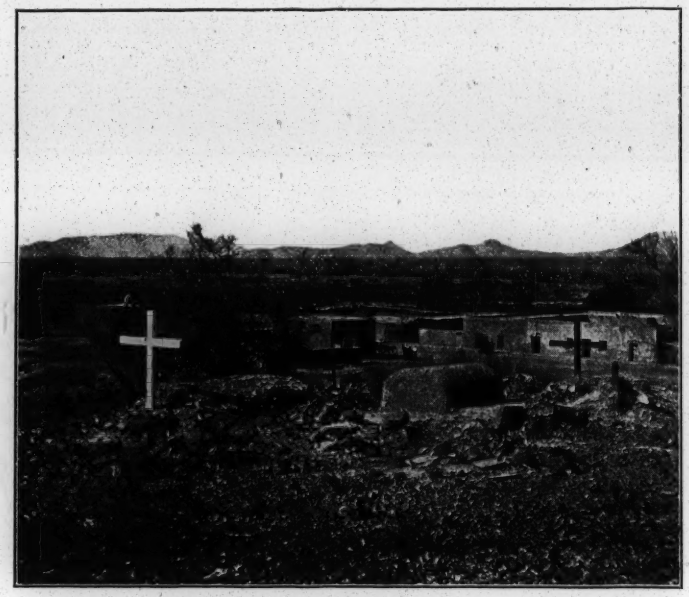
THE NATIONAL GEOGRAPHIC MAGAZINE

THE OLD YUMA TRAIL

BY W J McGEE, VICE-PRESIDENT OF THE NATIONAL GEOGRAPHIC SOCIETY

THE distinctive part of the Old Yuma Trail lies between Sonoyta (long. 112° 50′) and Sierra Gila (long. 114° 05′), the southwesternmost range of Arizona; between these points it nearly coincides with the international boundary. East of the old-time Place of Corn there are several tributary trails. The ancient and modern pilgrimage-path leads westward from Baboquivari Peak (long. 111° 40′) to a capricious watering place at the southern end of Santa Rosa Mountains (long. 112° 30′), and thence on to Sonoyta; the early Mexican route led through Magdalena and Santa Ana, and thence through Altar and over the plains to the Santa Rosa water; the later Mexican approach (afterward adopted by many American pioneers) can be traced through Fronteras to the old mission of Tubac, and thence through Arivaca and Sasabe to a practically permanent water at the southern end of Sierra Baboquivari (Poso Verde), and on over the plains now intersected by the boundary to Santa Rosa and Sonoyta; while an alternative American approach lies through the ancient city of Tucson and by Coyote spring (at the northern end of Sierra Baboquivari) to the main trail anywhere east of Santa Rosa, and thence to Sonoyta. From this oasis westward there is but a single way to Tinajas Altas, near the southern end of Sierra Gila; but there the tracks diverge, one distributary leading down the northeastern side of the range to Rio Gila, another through a neighboring pass and thence directly northwestward to Yuma, with a third (theoretically at least; the way is practically impassable save by well-equipped expeditions) across the drifting sands stretching to Rio Colorado at the point touched by the Arizona-Sonora boundary.

The Santo Domingo of today stands on the site of the wooden cross erected by the padres over two centuries ago. It is a feudal Mexican village of the type prevailing in the remoter districts. Owned and governed (with constant fealty to the distant but beloved Presidente and the much-adored Carmencita, who is to Mexico what Victoria was to Britain) by Don Cipriano Ortega, it com-



"The Santo Domingo of today . . ."

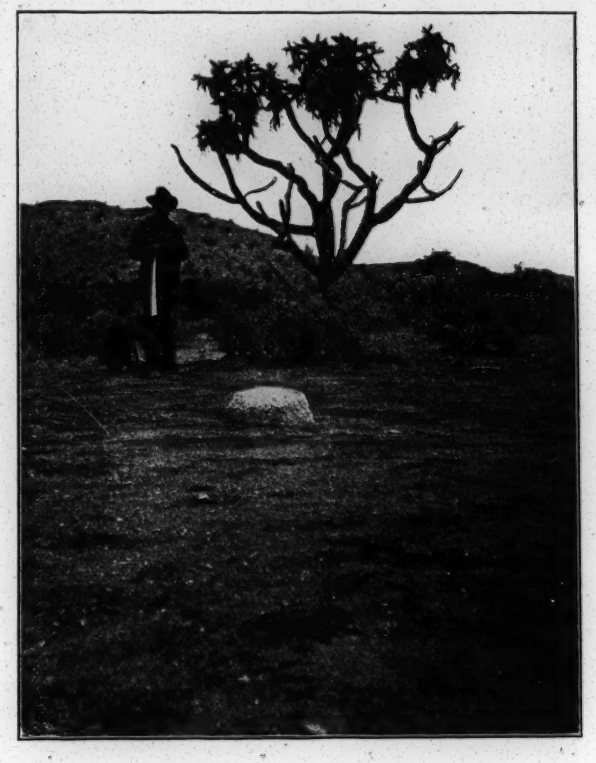
prises a chief residence, a habitation for the aduana (customs office), a smaller house occupied by a minor branch of the family, a church with horseshoe-shape bell arch, and three or four shops and stables, all of adobe, flat-roofed and one low story high; besides, there is an abandoned ore mill of half a dozen steam-driven arrastres, while half a dozen Papago Indian huts form the customary "lower town." The rancho is large, skilfully irrigated, and so productive that corrals and sheds are filled with vigorous stock and abundant grain-hay and barley. The nearest low spur of Sierra Sonoyta better attests the antiquity of the settlement than the few houses and inhabitants; for there the evangelists and their civil successors have laid seven or eight generations of their dead in cross-marked sepulchres, while hard by lies the much more populous cemetery of the Papago dependents—those of the pagan dead in the form of a *ki* (house), but built of stones and strewn with the bones of sacrificed horses; those of the converts in similar form, though built of earth and decently marked with crosses outlined in pebbles. At both residence and aduana the ethnologic expedition was welcomed and supported by Don Bartolo Ortega (in the temporary absence of the eldest brother), as well as by the local customs officer, Señor Garcias, the way having been made easy by the courteous prevision of Mexican authorities.*

ON THE WAY WESTWARD

On November 15, 1900, a six-mule wagon carrying all the casks and kegs

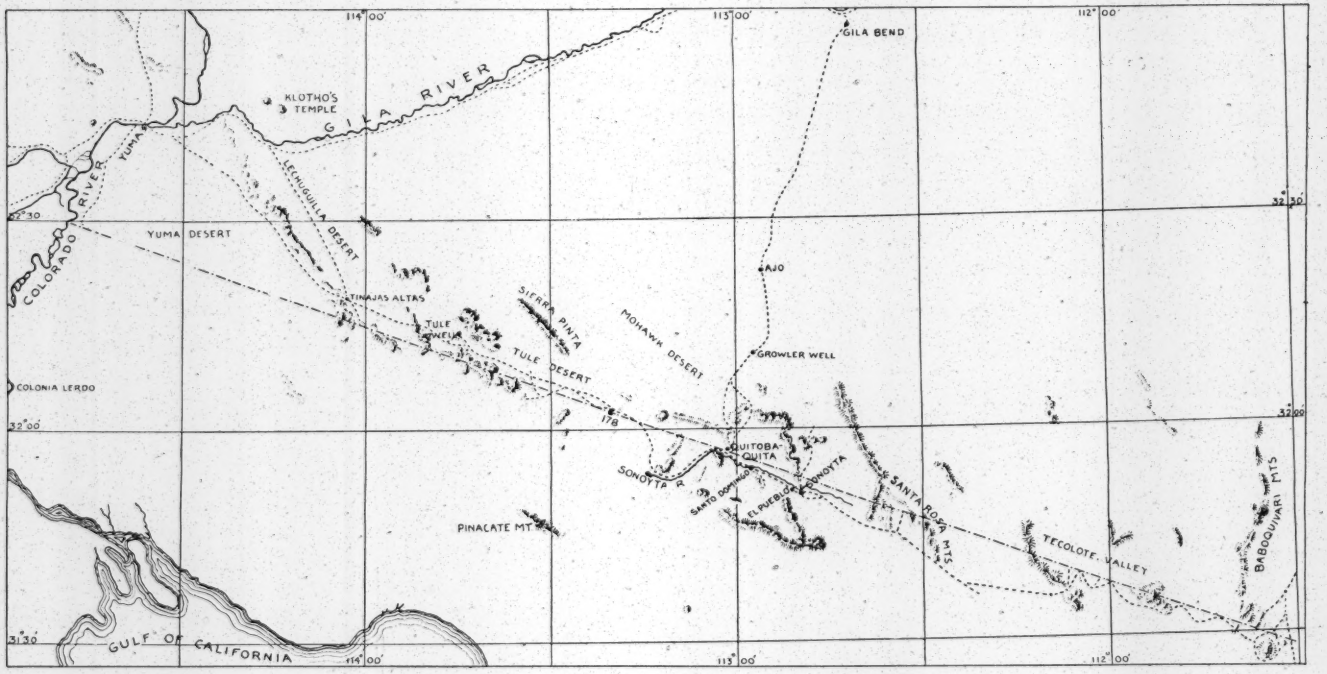
* His Excellency Manuel de Aspiroz, the Mexican Ambassador at Washington, and Excellencia Fernando Leal, Secretario de Fomento, in Mexico, were on this occasion, as on others, most liberal and obliging in furnishing authority for the international ethnologic work, while the Mexican authorities at Nogales were so generous as to send a representative to Phœnix, and thence with the expedition to Santo Domingo. The party comprised W J McGee, in charge; De Lancey Gill, artist; Professor R. H. Forbes, of Tucson, a guest during part of the expedition; John J. Carroll and Jim Moberly, stockmen; Aurelio Mata, Mexican customs officer, and Ramon Zapeda, Mexican interpreter, with Hugh Norris, Papago interpreter. The entire route was from Phœnix to Gila Bend; thence *via* Ajo to Quitobaquito and Santo Domingo; thence to Sonoyta and southward *via* Quitobac, Cozon, and Las Tajitas to Caborca; next westward to the Gulf shore (at the point recently occupied by the now extinct Tepoka tribe), and thence back, mainly by new routes, to Santo Domingo. From this point the old Yuma trail was traversed to Tinajas Altas, and thence *via* Gila City to Yuma, whence the expedition pushed on to the Cocopa country, near the mouth of Colorado river, afterward returning *via* Yuma and the Gila valley to Phœnix.

of both Santo Domingo and Sonoyta, besides a quarter-load of hay and grain, set out on the Old Yuma Trail under an arrangement with Don Bartolo to deliver water and feed in Tule Pass (sixty-odd miles away) by the third evening; next day the four-mule light wagon and the four saddle animals of the expedition were on the road betimes. Crossing the sandwash of Rio Sonoyta —a channel broad enough for the Ohio, deep enough for the Schuylkill, but dust-dry from bank to bank—the way meandered over a cactus-dotted plain simulating a vast alluvial deposit but revealing its origin by sheetflood carving in occasional projecting bosses of granite; passing monument 172, it swung a few yards north of the boundary to touch at Quitobaquito—the Papago village with five centuries behind it, and two adobe houses besides a half-dozen native huts within it. Here the entire white population (Mr. M. G. Levy, merchant, mine-owner, justice of the peace, and deputy sheriff) was avidly hospitable, the native residents attentive, as became the unusualness of the event; and the side-barrels and half-dozen canteens of the outfit were soon filled with the slightly alkaline yet palatable and wholesome water from the spring. Quitobaquito lies amid the southeasternmost foothills of a sierra bearing the name of spring and village; a dozen miles away the range divides, a spur setting off southward to form Cerro Salado (or Sierra de la Salada), and the trail veers partly to avoid this spur, partly to touch the "last water" near its tip.



"A cactus-dotted plain . . . revealing its origin . . . in occasional projecting bosses of granite."

Beyond Quitobaquito the ancient trail grows impressive. True, the narrow stock-path followed by the wagons is in large part new; but, as well seen from the crest of Cerro Huerfano, the new track diverges from the old only because the old was so deep that it has become a storm-cut arroya—indeed for miles Rio Sonoyta abandons the ancient sandwash during its brief spurts of activity to convert the wheel-worn way into a flood-channel. Prehistoric sites and relics of the early stone age are sparsely scattered over the plain; the ruins of a Mexican rancho, with well and corral and acequias, lie three miles west of Quitobaquito; and there is an abandoned ganadero (stock ranch) at the "last water" five miles beyond, known commonly as "Agua Dulce" from the



The Country of the Old Yuma Trail.

alkaline sweetness of the water, properly as "Agua Salada" from its salinity. The "agua" is merely the small residuum of underflow and local seepage brought to the surface of the Sonoyta sandwash by impervious ledges of Cerro Salado in their subterranean extension across the valley; and the banks and bottom are encrusted with frost-like efflorescences of mineral salts. The water is fair for stock, just potable for men; it is a resort for half-wild cattle and horses and burros ranging the sierras and valleys for twenty miles beyond; but the latest sign is that of Don Bartolo's outfit, whose casks and kegs were filled twenty-four hours earlier. Here we pitch a tentless camp, with the first graves of the Old Yuma Trail on a low spur hard by; the sky is clear, though the air is heavy and warm; and Coyote (the Wise One of Papago lore) creeps near to sing his rain-song—a sleep-breaking wail well understood of the vaqueros.

THE SUMP OF THE SONOYTA

The first faint dawn of the 17th is ushered by a slow sprinkle from low clouds, forming a fog-bank half way up the Cerro, but so light overhead that the brighter stars glimmer through; and blankets are hurriedly rolled and loaded, breakfast is bolted, and the outfit is under way in the gray twilight. With sunrise the floating fogs fade, revealing the entire salt-pan in which Rio Sonoyta comes to an end—a basin of a score square miles, bounded on the north by Cerro Salado and its footslopes, on the west by minor ranges running down from Sierra Pinecate, and on the southeast by a sheetflood slope studded with volcanic buttes and mesas; while the old valley opening southwestward to the Gulf stops at a dam of hundred-foot dunes marking the margin of the Red Desert—a sea-born tide of sand slowly engulfing the lowlands of Sonora from Rio Colorado to Lobos Point. This is the "sink" of the Sonoyta in the pioneers' vernacular, its evaporating vat in physical fact; after freshets it is lake or morass according to the volume of the flood, and then bottomless mire for weeks; now it is a Titan-patterned carpet of red, white, yellow, and black efflorescences, relieved by the greens of salt-enduring shrubbery on higher spots. On the hard-baked surface-crust the hoofs drum and the wheels rumble with a hollow reverberation more disturbing to animals than to men—albeit reminders to these of tragedies galore in the treacherous sump. A herd of wild burros see or scent the leading horseman from afar, and after deer-like stamps and snorts and other signals gather in a bunch, with dams and foals in the lead and males in the rear, to skim with amazing swiftness—recalling the wild asses of Arabia—down the rocky slopes and over the resounding playa obliquely across the trail toward the impassable sand-dunes; while an occasional band of half-wild horses may be glimpsed lurking behind mesquite clumps or scurrying for more distant shelter.

The trail leaves the Sonoyta basin about longitude 113° 10′, and ten miles south of the boundary; thence it wanders northwestward over rocky footslopes, bending slightly to avoid isolated buttes and curving more sharply to cross arroyos, for a dozen miles—to an imperceptible divide and the invisible frontier, where it enters a typical valley-plain of southwestern Arizona. Just outside the basin we overtake the supply outfit (which should have been thirty miles further on), and learn of the broken queen bolt and the long night ride by the Mexican to replace it, while the Indian staid by the stock; and we foregather to revise plans, swallowing apprehensions and a cold bite as the rare clouds of Papagueria gather to break in noonday showers and dispel the darkest danger of the desert. After arranging a rendezvous where galleta grass may be

found (for all stock trails are now left behind), the lighter outfit pushes on to outspan in sight of monument 178 (longitude 113° 20′)—the first "dry" camp on the Old Trail. Here sign of antelope and deer are seen, and the galleta is recovering slowly from the over-pasturage of the mid-century; Mr. Gill finds a curious aboriginal cache in a cavern of the volcanic butte on which the monument stands; and showers come and go throughout the night.

ACROSS PLAYAS AND MALPAIS

The second morning from Santo Domingo is cool and cloudy; blankets and saddles are stiff with the wet, the animals fractious; but three miles of smooth going and a rising sun bring comfort with the passage through a congeries of granite picachos rising abruptly from the level plain—and the pass is a gateway into Tule Desert. The first quarter of this expanse alternates between bare playa and a lax thicket of creosote (*Larrea*) growing in extraordinary luxuriance (clumps twelve feet high and branches fifteen feet long are common), while the silty floor is riven every few rods by giant shrinkage-cracks, often a foot or more wide and a yard or two deep. Fortunately the showers here have been light; yet the alkaline silt is tenacious mud, fetlock-deep for the mules and twice felloe-deep for the wagons. The next fraction of the valley is a tongue of the Red Desert, reaching in by the western end of Sierra Pinecate and stretching a dozen miles northward to lap the base of parti-colored Sierra Pinta; for five miles the old trail (which was lost in the playas) reappears here and there as a deep-worn way, partly filled and often obliterated by drifting sands; and the dead drag is the more dispiriting for the steady upgrade toward the malpais belt dividing Tule Valley.

This malpais—theme of many a traveler's tale—forms a notable feature of the old route. It is a vast sheet of black lava stretching toward Sierra Pinta from a group of craters (and probably unseen fissures as well) a few furlongs or miles south of the roadway; but while so youthful, in geologic sense, that the principal lines and lobes of flowage and the rugged scarps of the margins remain distinct, the surface is weathered into a pavement of pebbles bedded below in light yellow sand but polished above by a "desert varnish" of remarkable brilliance; and the pebbles are set so close that the varnished surfaces form a nearly continuous mirror miles in extent, reflecting light and heat with painful intensity. The malpais belt forms a low mesa on which an occasional scrubby mesquite or saguaro (*Cereus giganteus*) or pitahaya (*Cereus engelmannii*) has found lodgment; it affords fine views of the Painted Range on the north, of the serrate crests and pointed peaks brought out by the afternoon sun in Tule Mountains, and especially of Sierra Pinecate, now falling into the rear on the left; and the last view serves to rectify the reports of the pioneers by showing that Pinecate is not a crater but a range, that the malpais stops miles short of its nearer base, and that it rises from the Red Desert quite like other ranges of western Sonora, though to a loftier height than any neighbor. Through the polished pavement of black malpais the old trail is distinct as a line on a map; the larger pebbles and boulders have been thrown out of the way of wheels by generations of travelers, while the smaller are ground into the ashen sand; and at intervals not exceeding a few hundred rods the bordering pavement is broken by cross-shape pebble-piles marking the journey's end now of a youth, again of mother and child, elsewhere of two or three adult companions, but more commonly of the single traveler, as told vaguely by the size and form of the heap—all

grim reminders that among the pioneers the malpais was a favorite place for dying.

A DESERT STORM

The stock are breathed on the nearer edge of the malpais, amid passing showers; then pushed on (the lighter outfit gaining rapidly) toward Tule Pass. Meantime the clouds about the southeastern sub-range of Sierra Tule grow dense, while those on neighboring crests lighten; then the cloud-mass veils the sub-sierra to its base, and half an hour later sets slowly northeastward over Tule Valley toward the trail, so slowly that both outfits are across the malpais and in the western half of the Red Desert tongue before the tempest strikes.

A typical desert storm (though of exceptional severity) was this, and instructive in every aspect. While among the peaks the cloud-bank was about 3,000 feet high and flattened dome-shape above, five or six miles in diameter at two-thirds of the height, and three miles across at the level of the plain (the rain-lines seen in the lower third converging from both sides); and these proportions seemed to be maintained, save for slight flattening, as the mass drifted into the valley and grew in size. It was most orderly in behavior; its rate of advance—after its clinging hold on the sierra broke—was eight or ten miles an hour; and the roar of rain and wind on drifted sand and scattered mesquites was audible half an hour, ominous for half as long, before the storm was actually at hand. Steadily the rim of cloud-bank pushed forward, passed overhead, and eclipsed the entire heavens save the northeastern eighth; light sprinkles fell from it directly downward through still air at first, but grew heavier as they caught

"A tongue of the Red Desert."

the northeasterly air-drift; then rather suddenly—so quickly that prompt action was required to protect the wagon as the stock turned tail—the wind stiffened without changing direction, while the shower became a torrent; and ten minutes later a 35-mile gale was driving the drops in a nearly horizontal sheet above the dune tops, while the temperature fell from some 70° to about 35°, and small hailstones formed apparently within a dozen feet of the ground. Ten minutes more and the gale was down to a breeze, the torrent to a sprinkle; then the rearward margin of the cloud-bank drifted away before the continuing breeze, and the low-swinging sun shone brightly. The cloud-mass pursued its way toward Sierra Pinta, evidently meeting a misty cape already hung about its shoulders; with the conjunction there was much lightning and some audible thunder; then the vapor-bank spread along the range, and either melted away or drifted on northeastward. During the twenty minutes of continuous pour the precipitation was 1¼ or 1⅓ inches (estimated from catchment in water-pail, etc.); yet over the waste of drifted sand not a rill was formed, not a puddle was produced, not even a watery surface was seen save in the few "slick spots" (*i. e.*, alkaline silt patches) of the cowboys—the sand simply swallowed the flood like a sponge, and was visibly moist only to depths of 3 to 4½ inches.

The storm over, the outfit heads again toward the distant pass, though Moberly lifts his voice to tender (thrice over, in typical cowboy emphasis) a "bet that them there fellers let the mules break the tongue when the storm come up on em;" and a half hour later the Mexican gallops up, on a bareback mule with toes locked inside the forelegs, to verify the inference. So camp is made in a woodless spot (save for scattered creosote bushes), while "los gringos" turn back to make repairs and bring up the supply outfit to a point (about longitude 113° 33′) twenty miles short of that specified in the contract with Don Bartolo. It is the third night's stop, and the second "dry" camp on the old trail—though drenched blankets and hourly showers belie the vernacular designation for a desert camp.

THE WAY THROUGH TULE PASS

By daybreak of the 19th the wind shifts from southwest to northwest and grows chill, while gray clouds drive toward the dawn and crowd before the rising sun in a fashion more typical of deserts than of vaporous lands; and feed and water are transferred to the lighter outfit, while the supply team is turned back toward Santo Domingo—with a douceur to driver and aid, because they did no worse. The ancient trail forward is a deep furrow in the sands, and as these grade into the silts of the valley-margin toward Tule Pass the furrow becomes a series of sections of arroyos, normally setting obliquely across the trail, but diverted for rods or furlongs by the deeper cut of the wagon-way; and within five miles the arroyos bear marks of having run brimful for minutes or hours with the overflow from the sierra on the south. Gradually the way rises through sheetflood-carved footslopes, and then winds among buttes and granite walls toward an ill-defined divide; graves grow numerous again with the abundance of rocks to mark them; the year-old trail of an American on a shod horse and a Mexican on a shoeless beast forms a clear palimpsest over the 7-year-old tracks of the boundary parties; sign of deer and mountain sheep in pairs and flocks abound in the gulches, while coyote paths (unseen in Tule Desert) reappear. The pass is a meadow-like expanse of coarse granitic sand filmed with scrubby creosote clumps; here the trail divides, and a guide-post of sawn timber stands, soli-

tary and incongruous, to attest observance of a territorial law by the road supervisor of Yuma County—and incidentally to indicate "Tule Well" and advertise the name and wisdom of the last passer (the American horseman) in the feeling inscription "Agua Salada 75 miles—go back and fill your canteen. G. O. Taylor." Thenceforward the way is freshened and the mules heartened by the year-old trail of the conscientious supervisor.

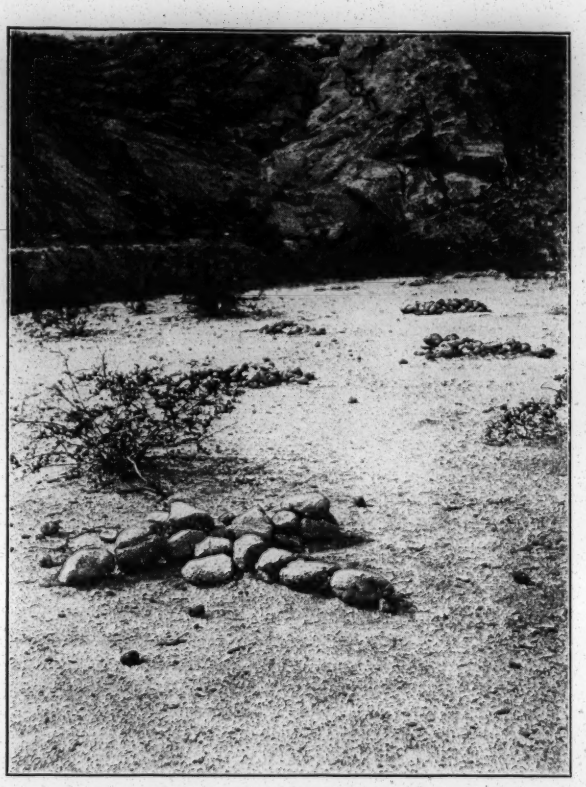
Tule well (longitude 113° 45′) is a mile or two from the main trail; it is now a name on map and tongue, and a caving pit in rocky detritus with a barrel of liquid at the bottom—liquid even more saline than that of the Gulf, in addition to its overpowering flavor of copper salts and strong tinctures of sodden insects and drowned rodents, from which even the thirstiest horses turn in wry aversion. In the palmy days of the Old Yuma Trail this was a way-station, as adobe ruins still proclaim; before the range was overpastured there was a slender flora which helped to hold moisture, and the water was made tolerable by constant draughts and renewals; now it is but an echo and a delusion, if not a poison-brew for the chance traveler. A league west of the old well and a mile from the main trail there is a high tinaja (water-pocket) in the granite range running down from Blackhead Butte (Cerro de la Cabeza Prieta), in which water may be found by a hard climb in winter and spring or after local storms; but the chance is a desperate one during most of the year.

Beyond the main amphitheater of Tule Pass the trail winds among granite buttes, sierras, peaks, knife-edge crests in bewildering variety and labyrinthine confusion; gray and cream, pink and rosy walls of solid granite rise sheer from flat valley-floors of crumbled granite; the way wanders through a two-mile rincon—a great natural corral—of granite walls, in which a city might be housed against cyclone or armed invasion; whole cubic miles of granite are constantly in sight—yet all this granite is but as a hand-specimen of northwestern Sonora and adjacent Arizona.

THE VALLEY OF LITTLE LETTUCE

Eight miles west of Tule Pass the rugged mass of Tule Mountains falls away, first on the left and then on the right, giving place to zones of malpais which slope down to Lechuguilla Valley; and here again the ancient trail is a thread of yellow in a field of black. Here, too, the narrow cemetery of the Old Yuma Trail grows more populous, for here the desert is most drear and water most distant; the grave-marks are too many to note—save the 30-foot circle of pebbles with a great pebble cross in the center recording the thirst-death of a family of seven who staked life on a demijohn of water which was accidentally broken. Captain Gaillard pictures this "cementeria," and adds: "The wagon tracks made when the poor Mexican drove his exhausted team to one side of the road were plainly visible thirty years afterward, and at the very spot still remain pieces of glass and wicker-work from the broken demijohn, and the skulls of the two horses." The sun swings low as we pass this pathetic memorial and others on the desolate malpais; and as it sinks behind Sierra Gila we push out a mile or two on the silty plain (longitude 113° 55′) and make the third "dry" camp, where the team-mules drink the last of the water, where ablution is not, and where the slender store of hay and grain comes to an end. But the blankets are still damp and the night is chill—than which there are worse things in desert life.

Lechuguilla Valley is named from an inconspicuous agave-like plant of three or four slender straggling stipes a few inches high; it affects chiefly the roadway and arroyos, leaving the glaring



"Looking down on threescore cross-marked graves."

silts to wide-scattered tufts of creosote and rare mesquites; and on this waste, with its speck of slow-moving outfit, rises the sun of the fifth day from Santo Domingo, the fourth from the "last water." The Gila range unfolds into another labyrinth of granites; but it is not until high noon that we draw up the sheet-flooded incline (with wheels grinding anon on granites like those of the crests) and pull up the short arroyo to the classic spot of the old trail—las Tinajas Altas (the high tanks, longitude 114° 5′). Here, thirty miles from the nearest habitation, and looking down on threescore cross-marked graves—and how many unmarked no man can tell,—we find the outfit of a hunting party (now absent on the chase), and after drinking deeply at the lowest basin fare sumptuously on their spoil.

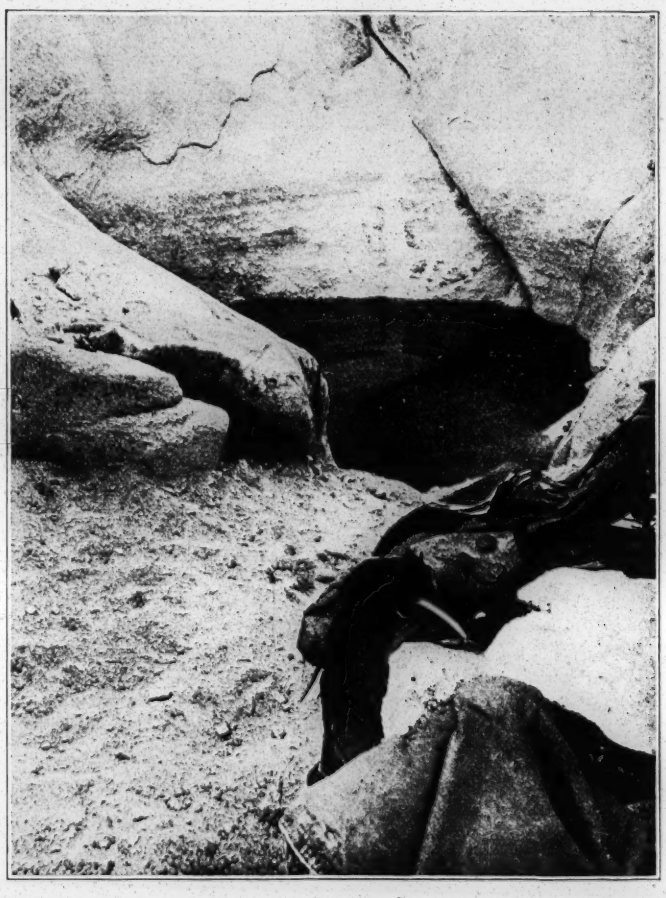
THE HISTORIC HIGH TANKS

Las Tinajas Altas are a series of water-pockets (partly pot-holes, partly cataract pools) worn in the gulch bottom by torrents following the rare storms of the region. The lowest and largest is confined partly by great boulders and granitic débris, and is reached by stock; 100 feet of finger-and-toe climbing over smooth rock leads to two others, and in 50 feet more there is a third; still higher one of the party climbs to a fourth, and thence on to the tenth, stopping at a smooth slope apparently leading to the eleventh basin holding water the average year round—"Old the Taime," in the quaint spelling of the Yuma supervisor on a guide-board seven miles away. The climb was made partly to examine the Indian mortars ground in the ledges and great boulders about every pool—mortars numbering hundreds if not thousands, some but a few decades old, but most so ancient that the polished bowls rise high above the unpolished rocks around them—mortars recording the visits of uncounted generations of devotees, to whom each laboriously-wrought basin was at once symbol of and invocation for precious food and life-giving water. One boulder bore 40 pits in its upper face, another 28; and up to the highest tinaja reached they are found in corresponding profusion. Most of them must have antedated Padre Kino, who passed this way just two centuries ago and mapped route and "Tinaxa" in 1702; and most of the others must have witnessed the long

procession of pioneers who trod the Old Yuma Trail to make California—and then watched the gradual settling of present desolation.*

Besides their historic interest, the high tinajas present problems in geology and in meteorology; but it may be noted merely that they lie on the lee side of a rugged range, the first to catch the humid air-drift from Gulf of California, and that their catchment gulch divides exceptionally long spurs of the narrow sierra.

Six miles north of Tinajas Altas the fifth camp-fire is lighted, and the team-stock revel in corn-meal while the saddle animals experiment suspiciously with hardtack and other man-feed; for the breakdowns of the supply outfit cost a day in dearly borne provender as well as in time.



"The lowest and largest is confined partly by great boulders and granitic débris."

The next—and last—day is a hard one for the beasts, since the way skirts the lower slopes of a plain (alluvial in the valley bottom, but sheetflood-carved above), over which the waters from a local storm in the mountains flowed yesterday—flowed not in coalescing streams such as gather on humid soils in humid air, not in the continuous sheetflood formed when soil and air are of the dryness normal to the desert, but in a plexus of interlacing rivulets uniting and dividing every few yards or rods, and digging little arroyos across the trail to the average number of a hundred per mile. Into these the wagon plunges and out of them it is pulled by the fagged mules hour after hour, until the breaks of Gila River give respite. From daybreak onward Castle Dome

*Kino's map is "Tabula Californiæ Anno 1702. Ex autoptica observatione delineata à R. P. Chino è S. I." The padre's cartography, but not his orthography, has been followed in many if not most later maps of the region.

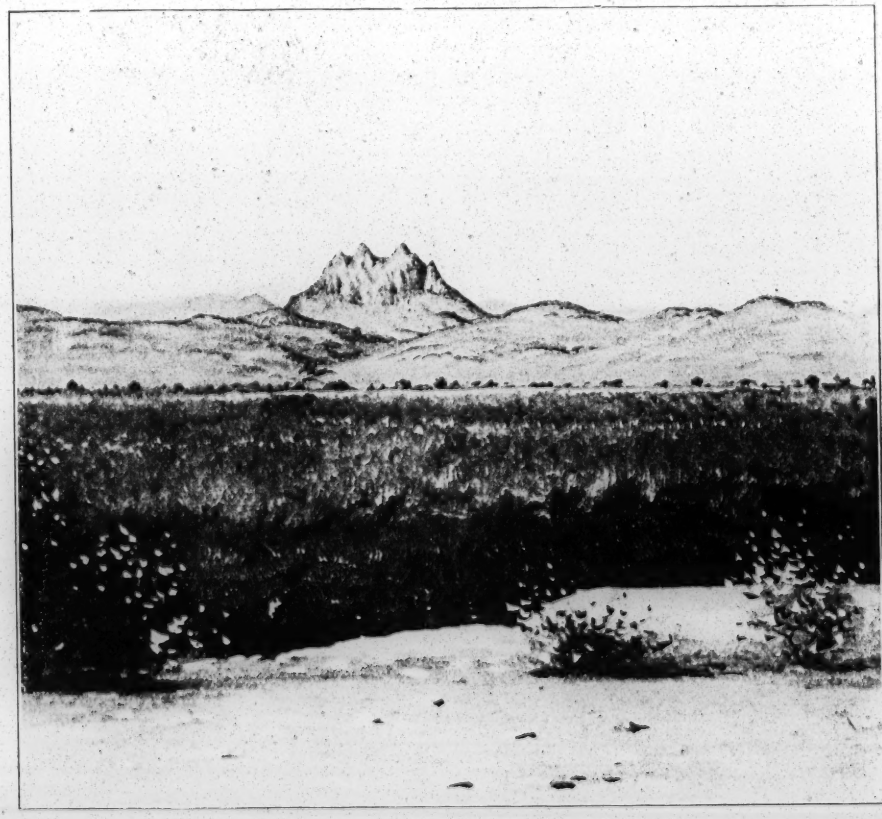
The colloquial rendering of the name introduces the local laison—it is lumped as Tinahaltas (vowels Spanish).

looms on the northern horizon 70 miles away, and plays with passing cloudlets made and unmade in swift succession; but the turreted volcanic mass just beyond the Gila (christened "Klotho's Temple" by Mr. Gill*) is more anxiously scanned as a landmark of growing promise. Even before midday stock trails—the first seen since leaving the Sonoyta range—begin to appear. In midafternoon a stray cowboy is spoken by Carroll; but it is long after nightfall of the sixth day from Santo Domingo before the animals are comforted with hay and barley from the single store in Gila City.

* Eight or nine miles east of Gila City; latitude 32° 46′, longitude 114° 14′, altitude 1,800 feet.

A LESSON OF THE TRAIL

No traveler over the Old Yuma Trail can fail to feel the incongruity of its present condition with its past history. It is the way of the western world to grow in population and wealth, to increase in industrial and intellectual tension; yet most of this ancient way is peopled only by graves, enriched but by memories, nearly as lost to labor and to thought as the sand-tombed cities of Arabia and farther Turkestan. The routes of Cabeza de Vaca and de Soto and Coronado are gone save to delving historians, the trans-Appalachian roads of our own grandsires are largely forgotten, many of the trails of the argonauts are effaced beyond retracing; but America probably presents no other lapse

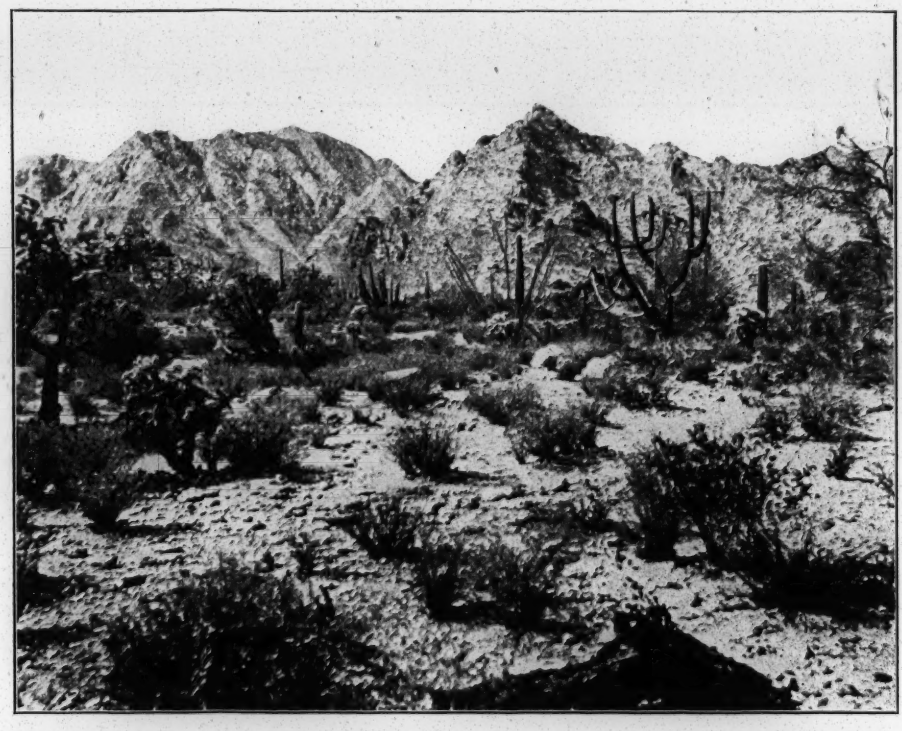


"The turreted volcanic mass . . . christened 'Klotho's Temple' by Mr. Gill."

from populous activity to utter desert so complete as that of the zone trodden by padre Kino and five generations of followers—and the lapse seems the greater because so uncharacteristic of occidental progress.

There was reason enough for the abandonment of the old route as a line of travel and traffic; the increasing safety of shipping first invaded its claims, the partition of Mexico next curtailed its functions, and the railways spanning the continent finally tapped its reservoirs at both termini; yet the factors leading to the abandonment of the route only partially explain the desertion of its purlieus, and serve rather to fix attention on the fact that the entire zone traversed by the trail was gradually impoverished by the long-continued—and short-sighted—overtaxing of its meager resources. When the earliest Caucasian pioneers came, they found the province peopled sparsely with semi-migratory Papago Indians, who wandered afar in search of water, located fields and villages even by the temporary wettings of chance storms, and erected shrines about the more permanent springs and tinajas—Tinajas Altas among others. They also found a fauna of deer and antelope and bighorn with their carnivorous consociates, as well as birds, rodents, reptiles, and insects in wide variety and moderate abundance; and as the basis of the motile life they found a varied flora delicately balanced between hard habitat and dependent fauna through eons of adjustment. True, the aggregate vitality was but a fraction of that characteristic of humid lands; yet the deficiency was partly made up by a longer individual life and a closer vital economy growing out of the exceptionally perfect solidarity characteristic of the living things of arid regions, so that the sum of living resources was sufficient for reasonable demands. Two or three generations of Caucasians drew on these resources in the easy way of restful latitudes without serious detriment; the missionaries and couriers followed tribesmen's trails to tribal domiciles, and shared water and food with or without material exchange; their animals found forage in grassy and shrubby spots, while they were able to take game or gather cactus fruits in season with little effort; and so long as they were few, the vital balance established through eons of earth-making was little disturbed. With the third or fourth generation and the gradually increasing numbers of Caucasian travelers, the resources began to suffer; the forage grew scant, the wantonly harried cacti withdrew from the nearer borders, the big game became wary and betook to other ranges; with the decimation of plants and the trampling of stock the soil grew less retentive of the scant moisture, in a ratio probably higher than that following deforestation of humid lands, so that the meager ground-water disappeared, the smaller springs went dry, and the chance tempest brought bane rather than the boon of the olden time; and with each decade of vital degradation the Papago tribesmen withdrew to remoter haunts, or else degenerated into a parasitical dependence on the wells and wastage of the whites. Still the natural balance was not utterly destroyed until the Anglo-Saxon came with that intense energy which balks at no obstacle, brooks no delay; he deepened old wells and dug new to catch the last drops of dwindling ground-water; he not only drove herds to devastate the enfeebled flora along the way, but stocked the adjacent ranges with cattle and sheep to supply the needs of multiplying travel; and he stopped only at the fortunate conjunction of railway-making on more northerly lines with the utter eradication of the grasses and other forage plants along the old route, and the consequent extinction of the useful fauna and destruction of the minor waters.

The American desert stands apart from



"Plains still mantled with herbage and grazed by herds of deer as in pre-Columbian times"

that of the Old World in superior vitality; with corresponding conditions of climate and soil, a peculiar flora of leafless, thorny, waxy-skinned, light-utilizing forms, and a distinctive fauna take the place of lifeless sand, and the characteristics of fauna and flora combine with several lines of geologic evidence to prove that the arid provinces grew slowly during several periods, running at least from the early Neocene to the present. It was during these periods that the unparalleled solidarity of our desert life was gradually developed;*

*As pointed out elsewhere, this solidarity matured on certain lines in agriculture and concomitant zoöculture in the very province traversed by the ancient route. Cf. "The Beginning of Agriculture," American Anthropologist, vol. VIII, 1895, pp. 350-375; "The Beginning of Zoöculture," ibid., vol. X, 1897, pp. 215-230.

from age to age the forms and forces of animal and vegetal life coöperated in common strife against sun and sand, and were forced by the hard environment into a harmonious interrelation in which none could dominate without risk of starvation, none yield unduly without certainty of extinction. Into this complex mechanism the prehistoric forbears of the Papago insinuated themselves so gently as scarce to disturb the relations of parts; into the same mechanism the Papago themselves pushed their way harmlessly when driven into the outer deserts; but the natural interrelations were too delicate to withstand the violent entry of the Anglo-Saxon, and the weaker organisms withered before him. Other provinces have suffered from the brash vigor of Caucasian conquest; forests have been sacrificed and

woodlands despoiled into sterile wastes; fields have been ill-wrought into barrenness and then turned out to wash into neighboring waterways, thereby ruining both hill and dale; mines and quarries have been so unwisely worked as to check other industries for decades and entail public losses far exceeding personal gains. In legion ways the adjustment of American settlers to new environments has been destructive, yet no new contacts have been more disastrous than those between the pioneers from humid fatherlands and the finely-balanced vital solidarities of arid regions; and of all the examples of destructive contact between pioneers and precursors none are more impressive than those so clearly attested by the Old Yuma Trail.

Happily, the dark lines of the picture carry a brighter complement: Science—and American progress is but science practically applied—advances through experiences, both of success and failure; no success could be more instructive than the failure attested by the abandonment of the country along the historic route; and this failure at once attests the folly of disregarding natural conditions when settlement is pushed into unfamiliar regions, and indicates the wisdom of weighing natural conditions as means of nature-conquest. The natural potentiality of the country traversed by the old trail is proved by the condition of the neighboring plains on the southern side of the Sonoran boundary which have never been overstocked—plains still mantled with herbage and grazed by herds of deer as in pre-Columbian times; and the slow resetting of shrubbery along the old way gives definite promise of restoration to the early state, while the moderate fruitfulness of the Sonoran plains points a way in which the growing resources may be utilized by patient adjustment of industries to natural conditions.

So the wisdom, if not the imperative necessity, of adjusting means to conditions in the reclamation of arid lands is the leadling lesson of the Old Yuma Trail.

ADVANCES IN GEOGRAPHIC KNOWLEDGE DURING THE NINETEENTH CENTURY*

By Brig.-Gen. A. W. Greely, Chief Signal Officer, U. S. Army

In these days geographic exploration means not merely the topographic distribution of mountain or river, of lake or plain, but also the determination, in a cursory manner at least, of existent vegetable and animal life, of climatic conditions, and especially of the ethnology of inhabited areas.

In forecasting the evolution of any aspect of the twentieth century the soundest base must be the advances of the nineteenth century along like lines of research. Judged by this standard, the present century will perfect the aspirations of the explorer of the last century to make known the entire surface of the earth. Few appreciate the enormous advances in geographic knowledge dur-

* Revised and republished by courtesy of the publishers of the *New York Tribune*.

ing the last one hundred years, which may be summed up in the general statement that fully 60 per cent of the world's land area was unexplored in 1800, while scarcely 10 per cent now remains unknown.

At the commencement of the last century the four greatest geographic problems were the Northeast Passage, the Northwest Passage, the sources of the Nile, and the North Polar quest; the last only remains.

ONE ARCTIC PROBLEM SOLVED

The Northwest Passage first yielded its secrets to the energetic explorers of this age, the result being attained by a series of voyages, almost entirely under British auspices, that are unsurpassed in number, duration, and heroism. Attempts for a Northwest Passage, interrupted by the death of the great navigator, James Cook, who lost his life therein, were renewed owing to the success of William Scoresby, Jr., in exploring East Greenland, 1817–'22. Prosecuted both by land and sea, material advances came through Parry, Ross, and Franklin, 1819–'35, while the voyages of Austin, Belcher, Collinson, McClintock, McClure, Rae, and others in search of Franklin, 1845–'59, completely solved the mystery.

Parry, in three notable voyages, explored the greater part of the islands and waterways north of America half way from Baffin Bay to Bering Strait, passing north of the magnetic pole. John Ross explored the Felix Boothia Peninsula, the north point of the continent of America, while his lieutenant and nephew, James C. Ross, located the north magnetic pole at Cape Adelaide, 70 degrees 5 minutes north, 96 degrees 44 minutes west. The north coasts of America were outlined by the land journeys of Franklin, Beechey, Dease, and Simpson, 1819–'46, from King William Land west to Point Barrow.

Other notable advances have been made in Arctic America by Inglefield, Kane, Hall, Nares, and Greely in Grinnell Land and Northwest Greenland; by Drygalski, Geisecke, Garde, Holm, Steenstrup, and other Danes in Western Greenland; by Scoresby, Graah, Koldewey, Payer, Nordenskjold, Garde, Clavering, Holm, Ryder, and Peary on the east coast, while Nansen and Peary have crossed the inland ice, the latter to the extreme southeastern point of the new land to the north of Greenland, discovered by Greely in 1882.

ADVANCES TOWARD THE NORTH POLE

Spitzbergen has been fully explored by Gaimard, Nordenskjold, Torrell, Leigh Smith, and Conway. Weyprecht and Payer discovered Franz Josef Land, whose limits have been extended and defined by Leigh Smith, Jackson, Nansen, and Wellman. De Long drifted from Bering Strait to the New Siberian Islands, and Nansen's extraordinary continuation of De Long's drift around Spitzbergen has most materially advanced our knowledge of the Siberian and Polar Seas.

Advances toward the North Pole have been made through the exertions of Scoresby, 81 degrees 30 minutes north; Parry, 82 degrees 45 minutes north; Nares, 83 degrees 20 minutes north; Greely, 83 degrees 24 minutes north (the most northerly land as yet); Nansen, 86 degrees 14 minutes north, and Abruzzi, 86 degrees 33 minutes north, within 207 geographic miles of the Pole.

As to the Northeast Passage, Nordenskjold, having faith in both its scientific value and practicability, selected Palander as his navigator. Sailing from Tromsö in 1878, they passed Kara Sea successfully and readily rounded the north cape of Asia. Beset by ice and obliged to winter within 120 miles of Bering Strait, Nordenskjold com-

pleted the circumnavigation of Asia in 1879.

Within the Antarctic circle, to the south of Patagonia, Palmer, Bellinghausen, Biscoe, Larsen, and Gerlache discovered Palmer Land and adjacent islands. To the south of New Zealand Belleny found islands, and James C. Ross added to his arctic laurels by discovering ice-clad Victoria Land, with its flaming volcanoes, and in locating the south magnetic pole. South of Kerguelen is the Enderby Land of Biscoe, while southeast of Tasmania an archipelago of desolate islands, located by Wilkes and D'Urville, marks the northern limit of ice-clad Antarctica.

EXPLORATION OF AUSTRALIA

The greatest southern confederacy, Australia, has a European population exceeding five millions; but in 1800 its two thousand settlers did not even have a country with a recognized name. As New Holland, it appeared on the best maps, a featureless central area, with its outlined coast largely conjectural. Surveys of the coast, begun by Bass and Flinders, were finished by King, 1822; Wickham and Stokes, 1837–'43. Inland, Hughes solved the hydrographic problem of the Murray watershed, Eyre traced the south coast along the Great Australian Bight. The central desert was made known by Mitchell and Sturt, while Grey and Gregory explored in the northwest and Leichardt and Kennedy in the northeast. The most fruitful journey was that of Stuart, 1858–'62, from the inhabited south coast to the extreme north, which opened a fertile, well-watered district to colonization. The western desert has been explored here and there by Forrest, Warburton, and Giles, the last named having twice traversed the great Sahara, east and west.

New Zealand first came to our knowledge by missionary labors, 1814–'30, and later by commercial extensions and gold-hunting. New Guinea has been explored in the last half century by Wallace, Meyer, Forbes, Von Schleinitz, and Dallmann.

OPENING UP SOUTH AMERICA

Of the Americas, the longest known is least explored. South America, however, was fortunate in the beginning of the century, 1799–1804, with such investigators as Humboldt and Bonpland, who traversed Venezuela, determined the remarkable bifurcation of the Orinoco, visited Magdalena, Quito, and the volcanoes. This journey was not only locally important, for it gave an extraordinary impulse to the comprehensive study of the earth. Von Eschwege, Von Wied, Saint-Hillaire, Spix, and Martius explored the interior of Brazil from the Amazon Basin; D'Orbigny and Castelnau devoted themselves to the geography of the central regions between the Rio de la Plata and the Amazon; Darwin, Wilkes, and Gillis explored the coast lines of the continent; Wallace and Bates did wonderful scientific work in the Amazon Basin, followed by Agassiz and a host of other explorers. Of the tributary basins of the Amazon, Steinen has mapped the Xingu, Church the Madeira, Chandless and Labre the Purus.

In the Guianas Schomburgk's researches are the most valuable. In late years the most important explorations are doubtless those of the French international polar expedition at Cape Horn, under Martial.

PATHMAKERS IN NORTH AMERICA

Of the continents none other has so benefited by the explorations of last century as North America. To the genius, tact, and energy of Humboldt was early (1804) due modern geographical knowledge of Spanish America, which was

materially increased by the explorations of Pike from St. Louis to Chihuahua, *via* the Kansas, Arkansas, and the Rio Grande.

Kotzebue and Zagostin in the first half, and Dall, Kennicott, and Allen in the last half, of the century have outlined the general features of Alaska. In the Stikine, Klondike, Tanana, Nome, and Koyukuk regions the gold hunters have explored thoroughly. In Canada the early discoveries of Franklin, Richardson, Rae, and Back have been supplemented by Petitot in the Mackenzie Basin, Dawson and Ogilvie in the Yukon watershed, Bell and Tyrrell around Hudson Bay, Boas in Baffin Land, and Low in Labrador.

As regards the United States, the country west of the Mississippi was almost entirely unknown in 1800. The early trans-Mississippi explorations form one phase of the history of the United States Army. The most fruitful in results of such journeys is that of Lewis and Clarke (1804–'06). They ascended the Missouri from mouth to source, crossed the continental divide, traced thence the Snake and Columbia to the ocean, and returned *via* the Yellowstone. For the first time the United States was crossed from the Atlantic to the Pacific. This demonstration of the practicability of overland travel was an essential factor in the occupancy of Oregon, which gave the first foothold for the American on the Pacific Coast.

MAPPING THE GREAT WEST

Pike explored the valleys of the upper Mississippi, Arkansas, and Rio Grande, crossed part of Chihuahua and Texas, then unknown countries. Bonneville (1832–'36) explored the valleys of the Platte, Green, and Yellowstone, and, pioneer of the Oregon trail, twice crossed to the Columbia, passing west *via* the Snake River, the Grand Ronde, and Blue Mountains. He also made known the great basins of Salt Lake and Humboldt River and the pass across the Nevadas to the Sacramento. Bonneville first correctly charted the hydrography of the trans-Rocky Mountain regions, and eliminated the Rio Buenaventura and other mythical streams. Frémont's journeys were important as initiating an extensive series of scientific explorations. Kearney surveyed the boundaries of Texas and Louisiana, Boone the country between the Arkansas and Canadian, and Emory from Leavenworth to San Diego *via* the Arkansas, Del Norte, and Gila.

Among the many expeditions may be mentioned that of Simpson to the Navajo country, Stansbury to Salt Lake, Sitgreaves to the Zuñi and Colorado Rivers, and Mullen from Walla Walla to Fort Benton. Important surveys are those of the Pacific Railway route by McClellan, Whipple, Parke, Williamson, and Derby; the Mexican boundary by Emory, the northwestern boundary (1857–'61), and in later years those of King, Hayden, Powell, and Wheeler, which have elucidated most of the geographical problems in the United States.

RIVALRY IN ASIA BEGAN EARLY

In the geographical as in the political evolution of Asia the potent forces have been Great Britain and Russia, so that Northern and Southern Asia have been almost separate fields of enterprise for the dominant nation, with Central Asia as debatable ground for rivalry by both nations. In Northern Asia explorations in the early century were confined largely to the local extensions of knowledge, except additions to the New Siberian Islands by Samkif, Sirovatskof, Hedenstrom, and Sannikof, 1805–'11; of the Siberian Ocean by Wrangell and Anjou, 1820–'23, and in Nova Zembla by Lütke, 1821–'24; Pachtussow, 1832–'35, and Baer and Zivolka 1837–'38.

The foundation of the Imperial Russian Geographical Society in 1845 gave impetus and direction to Asiatic discoveries, increased knowledge of the Russian Empire being the aim. From 1849 to 1857 Hoffman, Aksakof, and others explored the Ural region and the ethnographic features of Russia proper and of Western Siberia. Extending in scope from 1857 to 1871, besides Siberian researches in Amur, Usuri, and Saghalin, the Caucasian and Aral-Caspian regions were explored in the southwest, while to the east many expeditions entered Turkestan, Manchuria, Khorassan, and Mongolia.

Between 1871 and 1885 Central Asia, Mongolia, and Western China were explored, largely through Prjevalsky, and international polar stations were established on the Lena and in Nova Zembla. Severtsoff and Fedchenko explored Turkestan minutely; the deserts of northwestern Siberia and Lake Baikal were examined and a sea route opened from Tobolsk by way of the Kara Sea to St. Petersburg.

TIBET IS A MYSTERY YET

During the last fifteen years attention has been paid to Caucasia, Turkestan, the Amur, and Black Sea regions. In these years perhaps the most interesting explorations are those of Hedin, who crossed the desert of moving sand hills between the Yarkand and Khotan Rivers, outlined the northern rim of the great Tibetan Plateau, and examined Lob Nor Basin.

Explorations in Southern Asia originated in the desire to extend inland the sphere of British influence. Political considerations speedily entered into the problem, and those barriers proved more difficult to surmount than physical obstacles. In reaching the Himalayan foothills, and later in passing across the ranges into Afghanistan and Tibet, the explorer necessarily awaited brief intervals in the wars of conquest and occupation.

Manning succeeded in entering Tibet in 1811, but was soon expelled. Non-intercourse was so rigidly enforced that the British surveys had recourse to selected native agents, and most of the early advances were made through secret journeys of pundits, among whom Chandra Das stands foremost. As usual, much has been learned by missionary labors, especially in Tibet, through Huc and Desgodins, the latter also contributing much to a knowledge of Indo-China. In recent years both countries have been explored by Rockhill, Bonvalot, Littledale, Szechenyi, Henri of Orléans, and others, especially the pundit Nain Singh, under conditions that leave much to be added.

Japan has opened her unknown empire to the world. While much has been done by Japanese travelers to make its geography known, yet the geological researches of Naumann should be noted.

MAP OF AFRICA FILLED IN

The extent to which exploration changed the map of Africa during the nineteenth century is known only to professional geographers. It is true that in 1800 the entire coast of Africa was known with some definiteness through the exertions of Portuguese navigators in previous centuries. Yet apart from the valley of the Nile geographic knowledge of the interior was confined to a scant hundred miles southward from the Mediterranean and northward from the Cape of Good Hope and to the estuaries of the Zambezi, Kongo, and Niger.

Geographic knowledge stopped almost within sight of the sea or the Lower Nile. Scarcely fifty years since there appeared, from 5 degrees north to 10 degress north, on the best maps of Africa, the legend, "Kong Range, mountains supposed to extend across

the continent." Today it is known that this central area forms part of the great Kongo Basin, with a population of more than forty millions.

In outlining the march of exploration toward the interior of the "Dark Continent" only the most succinct account is possible. For clearness of statement, explorations are treated under five general heads: First, trans-Saharan, from the Mediterranean; second, the Niger regions; third, the lake regions near the Upper White Nile; fourth, the Zambezian region, and, fifth, the Kongo Basin.

According to different definitions of a desert, the Sahara varies in area from 2,500,000 to 3,500,000 square miles, of which the eastern third is generally known as the Libyan Desert. Hitherto this desert area, with scant water, intense heat, and whirling duststorms, interposed an inaccessible barrier between the Hemitic nations of the Mediterranean coast and the negro tribes of the Sudan.

SAHARA'S BARRIERS OVERCOME

Explorations of the Sahara were fruitless until Oudney, Denham, and Clapperton crossed (1822–'24) from Tripoli to Lake Chad, in the Sudan. Laing, following, crossed from Tripoli *via* Ghadames and Tuat to Timbuktu, the mysterious city of strangely exaggerated importance from previous centuries. Panet, Vincent, Duveyrier, and Lenz explored the desert between Senegal and Southeastern Algeria.

It was Barth who gave the first definite account of the Saharan region after a journey of great extent and importance. Starting from Tripoli, he crossed the Sahara to Lake Chad, passed Northern Hausaland to the Niger at Say, and thence reached Timbuktu. Returning northeast through Sokoto to Kukawa, he explored Bornu. Barth's journeys were of great value, for he not only made known to the world the existence and accessibility of hundreds of thousands of square miles of fertile territory, but he also gave in five volumes an enormous amount of geographical information, in which he treated quite thoroughly the ethnology of the various tribes of the Central Sudan. His successor, Rohlfs, after exploring Southern Morocco, penetrated the Sahara to the oases of Tuat and Ghadames, and those of the districts of Fezzan and Tibesti. He then crossed from the Mediterranean to the Guinea coast *via* Bornu and Lagos, on the Niger, the first European to make the journey. Later (1873–'78) he explored the oases in the Libyan Desert.

The Sahara, instead of being a low desert of marine origin, is an elevated plateau, which has been enormously denudated by the disintegration of its rocks through temperature changes and the distribution of its dust by high winds. It is not entirely rainless; has many fertile oases and only needs abundant water to produce luxuriant vegetation.

The first Europeans to cross Africa from east to west north of the equator were Matteucci and Massari, who traveled from Suakin *via* Kordofan, Wadai, and Kano to the Niger. Nachtigal (1869–'70) made a journey from Tripoli *via* Fezzan to the Libyan Desert, where he explored the remarkable mountainous region of Tibesti. Examining the Lake Chad district, he reached Egypt *via* Wadai and Darfur.

NIGER AND NILE AN OPEN BOOK

The mystery of the Niger, long erroneously supposed to flow through the Sudan to the west, was partly solved by Mungo Park, who, starting from Gambia, in his first journey reached Segu, on the Niger. His second expedition (1805) ended in failure. Clapperton, renewing the survey, perished, but his faithful assistant, Richard Lander, definitely solved (1830) the mystery of the

Niger by descending from Bussa to the mouth of the stream.

French energy has explored Senegal and Gambia by the journeys of Rubault, Mollien, De Beauford, and especially Caillié.

The great mystery of the Nile sources, after twenty centuries of speculation, has been solved by the labors of various explorers, most largely by Baker, Speke, and Stanley. Its largest lake source, Victoria Nyanza, was discovered by Speke, who missed Albert Nyanza. Baker discovered the source of the Blue (Abyssinian) Nile and the Albert Nyanza of the main or White Nile. To Stanley belongs the honor of the discovery of the remotest source, Albert Edward Nyanza, which feeds the Albert Nyanza through the Semliki River.

The fabled Mountains of the Moon have given place in Eastern Africa to a most remarkable lacustrine system. The vast equatorial lakes cover extensive regions, feed some of the largest rivers of the world, and by their transportation facilities favor commerce. Their central situation between the Cape and Cairo, convenient to the Indian Ocean and on the confines of the Kongo Basin, caused them to be recognized as the central key to African domination by Germany and Great Britain, who now control the region.

The largest lake, Tanganyika, was discovered by Burton, while Livingstone contributed Nyassa, Moero, Bangweolo, and others. Joseph Thompson, exploring south from Tanganyika, discovered Lake Rukwa and also traversed unknown Masailand.

LIVINGSTONE'S GREAT WORK

The discovery of the equatorial lakes was of subordinate import to that of the Kongo Basin, which grew out of missionary labors in South Africa. To the genius and energy of two men, David Livingstone and Henry M. Stanley, are primarily due the exploration and utilization of the vast unexplored regions between the Sudan and the Orange River.

Unquestionably the missionary Livingstone, who settled in Bechuanaland in 1841, was one of the greatest of African explorers. First discovering Lake Ngami, he turned his attention to the Zambezi Valley, and practically covered this basin in 1851–'56, and later, in 1858–'64, explored Lake Nyassa and the adjacent country. Most important results flowed directly and indirectly from the last journeys of his life, in 1866–'73, when, crossing the watershed to the very sources of the Kongo, he discovered Lakes Moero and Bangweolo, the Luapula and Lualaba Rivers, now recognized branches of the Kongo.

STANLEY

Stanley, who found the long-lost Livingstone, completed the exploration of the main Kongo Basin in a journey (1875–'78) which in its discoveries and results is unequaled in African exploration. His circumnavigation of the great lakes, Victoria Nyanza and Tanganyika, was important, but the crossing to the watershed of the Lualaba, which he proved to be the Kongo by following it to the Atlantic Ocean, was a journey of unsurpassed courage, persistency, and resourcefulness. His return to found the Kongo State was followed by extensive discoveries, such as Lakes Leopold and Mantumba, the Ubangi, Kasai, and other affluents of the mighty river. Stanley's geographic laurels were increased by his search for Emin Pasha, when he crossed Africa from the junction of the Kongo and the Aruwini over the Bantu borderland. He discovered not only an extensive and almost impassable forest, but also the ultimate lake source of the White Nile, Albert Edward Nyanza.

Stanley's exploration of the Kongo Basin was a potential force, second only

to that of Columbus' discovery of America. Each explorer opened up a new continent, and gave rise to scientific and philanthropic schemes which affected the progress of the world.

Europe awakened to the importance of the Kongo Basin, with its great lakes, its ten thousand miles of navigable rivers, which leave no part of the basin one hundred miles distant; its fertile valleys, its animal life and vegetable resources, and its millions of inhabitants. Africa speedily became the center of commercial exploitation, which was not confined to private enterprise. Most fortunately, by act of international conference the Kongo Free State, with an area of nearly a million square miles, became independent. Presenting the greatest natural possibilities, it practically bears, in interest and importance, the same relation to Africa as does the watershed of the Mississippi and its tributaries to the United States.

By rail and steamboat one now travels from the west coast, through the Kongo State, more than half way across Africa. Its revenue is counted by tens of millions of francs, its exports and imports increase steadily, and, apart from the 12,000,000 inhabitants of the French Kongo, it has a population of 30,000,000. The effect of the geographic evolution of Africa upon Europe may be estimated by the statement that Belgium, in its relations with the Kongo State, deals with a country whose area is one hundred times its own, and that of the 11,500,000 square miles of Africa all but 500,000 are European dependencies.

OCEANOGRAPHY A NEW ART

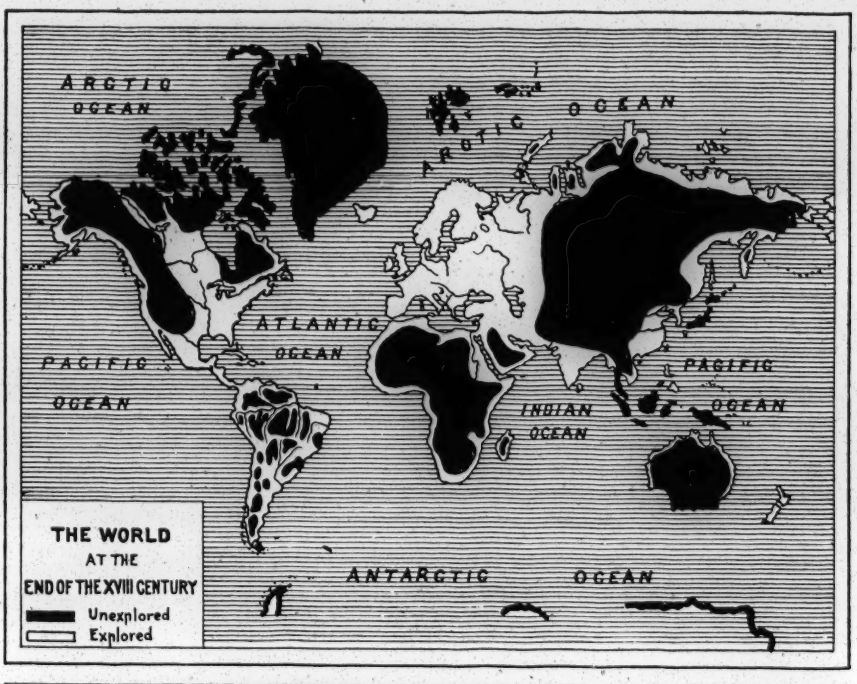
As to oceanography, a development of the nineteenth century, space only permits allusion to the work of Sigsbee, in the Gulf of Mexico; Carpenter, Thomson, and Norwegian savants in the North Atlantic, and Nares and Murray in the *Challenger* expedition. The latter work, under Murray's exposition, has outlined the main features of the oceanic world for the twentieth century to explore and chart in detail.

As to the twentieth century, it should be noted that pioneer discoveries are yielding steadily to scientific explorations. Future work will trend toward the outlining of existent and possible relations between man and his geographic environment. In this sense there remain numerous geographic problems whose satisfactory solution will tax many generations of scientific explorers. Such, for instance, are current investigations as to the acclimatization of Europeans in tropical Africa and the distribution of underground streams in the arid regions of Australia and the United States.

Reverting to pioneer discoveries, the twentieth century, despite unceasing efforts of this age, inherits an extensive legacy of unknown lands. Exploration for exploration's sake will for many years find ample scope in untraversed polar regions, Arctic and Antarctic, where the attainment of the Poles will continue to be largely the end in view.

Of unexplored areas West Australia now presents the most extensive, its vast desert having been examined only here and there along routes hundreds of miles apart.

While North America has large, vaguely known districts only in Mexico and Central America, yet South America presents many fields of great promise to adventurous men. This is especially true of the eastern slopes of the Andes in Ecuador, Colombia, and Brazil. In the western half of the drainage basin of the Amazon exploration has touched only the banks of navigable streams. Our knowledge is largely conjectural as to the extent and distribution of its forests and upland and of the existent conditions of its fauna, flora, and inhabitants.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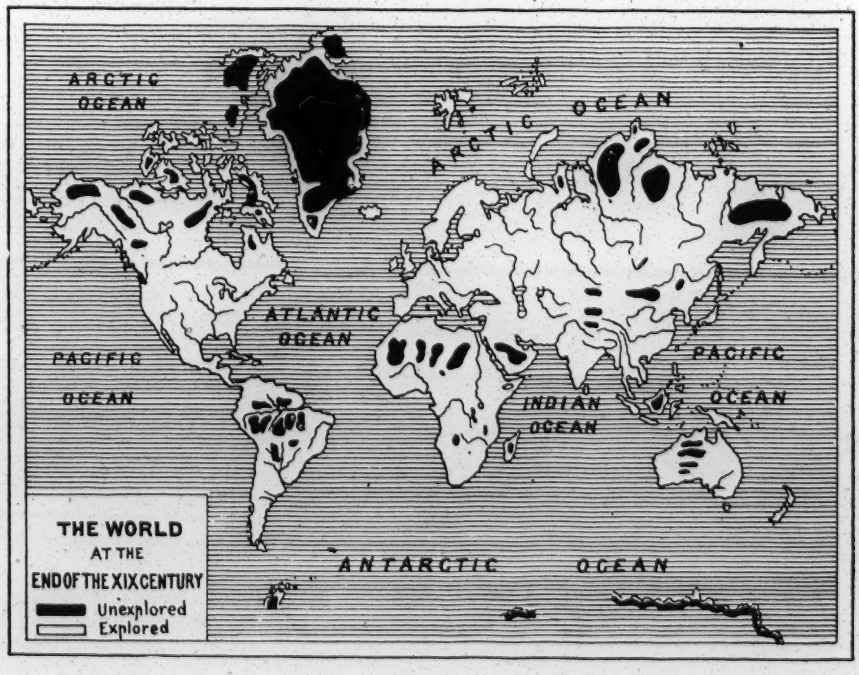
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END OF THE XIX CENTURY
Unexplored
Explored

VIRGIN FIELDS REMAINING

Even in Africa, which for a quarter of a century has engrossed the zeal and energy of explorers, there is much yet to be made known and charted. Not only is there great work to be done in the Libyan Desert and the Central Sahara, but even the country of the Taurigs, in Western Sahara, needs thorough exploration. South of Abyssinia and northwest of Lake Rudolf is almost virgin ground. The most interesting areas are the primeval forests in the basins of the Ubangi and Aruwimi. These regions invite naturalists and ethnologists to reveal to the world their fauna, flora, and ethnology, and especially to correlate information on the pygmies of Du Chaillu, Stanley, and Schweinfürth.

The new year presents such political complications as insure tremendous changes in eastern Asia during the twentieth century. As rehabilitated China concedes extended spheres of foreign influence, geographical knowledge will grow apace. Gradually the great blanks in Manchuria, Mongolia, Tibet, and Indo-China will be filled on maps of Asia. Like advances may be expected as to Arabia, Sumatra, Borneo, the Malay Peninsula, and especially the Philippine Archipelago. In the last-named region the almost untraversed islands of Mindanao, Mindora, and Palawan will soon yield to the energetic and intelligent explorer the long-hidden secrets of nature as to their fauna, flora, and capabilities of service to mankind in general and to the United States in particular.*

MEXICO OF TODAY

BY SENOR DR. DON JUAN N. NAVARRO, CONSUL-GENERAL OF MEXICO IN NEW YORK CITY

MY object in preparing this paper is to present to the members of the National Geographic Society and to the readers of its journal some well-ascertained facts about the Mexico of today and the many natural and commercial attractions which make it one of the best places in which to invest capital with security and the promise of a speedy and splendid return. Before entering upon my subject I wish to state that my words and opinions are made on my own responsibility, and are in no sense semi-official. In speaking of my own country I can hardly be required to be impartial in my opinions, but in the statement of facts I shall endeavor to give not only my own private

* Other papers on the advance in geographical knowledge during the past one hundred years are:

"The Progress of Geography during the Nineteenth Century." By Gilbert H. Grosvenor. Appendix to the Report of the Secretary of the Smithsonian Institution for 1900.

"The Transformation of the Map (1825–1900)," By Joseph Sohn. Scribner's Magazine, March, 1901.

"A Century of Exploration." By Cyrus C. Adams. The World's Work, January, 1901.

"The Geographical Conquests of the Nineteenth Century." By Angelo Heilprin. The N. Y Evening Post, January 12, 1901.

"Fields for Future Explorers." By Sir Henry M. Stanley. Windsor Magazine, January, 1901.

"Welche Erdgebiete sind am Schlusse des 19 Jahrhunderts noch unberkannt?" Von H. Singer, *Globus*, 2 Juni, 1900.

judgment, but the opinions of persons and newspapers who have nothing to expect or fear from Mexico.

Some years ago I knew by sight a tourist who went to Mexico City and staid there exactly a week, not knowing, of course, a single word of Spanish, and on his return home published an article on Mexico, relating all his romantic adventures in the country, among which was an attack by a band of robbers on a stage coach where that remarkable man was traveling. The captain of this band was none other than a black-eyed Señorita, who practiced the dangerous and romantic vocation of highway robbery. All those adventures were very entertaining, and their only fault was not to have any existence except in the fertile imagination of their inventor.

Within the past thirty years the means of transportation have wonderfully increased. Instead of sailing vessels and a steamer every three weeks, there are now two regular steamers every week and many "tramp" steamers, and by land we have four railroad lines connecting the two countries.

The configuration of the land of Mexico is very peculiar; low near the coasts, it ascends continually and very rapidly to the interior, until an altitude from 6,000 to 10,000 feet is reached above the sea-level, arriving at what is called the "table land."

Our capital, Mexico City, has an elevation of nearly 7,400 feet—that is to say, it is from 800 to 900 feet higher than the highest peak of Mt. Washington, which has an elevation of 6,500 feet. Although the city is only a little more than 19 degrees north of the Equator, it never experiences a tropical summer. That a light overcoat is needed in the evening at every season of the year is seldom appreciated by foreign travelers, who, under the notion of visiting a tropical country, come provided only with summer clothing, and thus often contract diseases consequent upon exposure to the cold air.

Not a single navigable river traverses the whole country. This unfavorable natural condition has necessitated the building of many railroads at an enormous cost over the mountainous soil.

Our constitution is similar to that of the United States in the main points. Mexico is a federal republic, divided into States and Territories; the former ruled by their particular constitutions, and the latter directly governed by the federal authorities. The executive is appointed by popular election every four years, but as the constitution prescribes no limits for reëlection, we all have had the pleasure, and, in our opinion, the good sense, of reëlecting General Diaz for the fifth term, ending on November 30, 1904.

Perhaps some persons will not deem it in accordance with republican ideas to reëlect a man so many times, but we Mexican citizens answer that if it is not in accordance with certain theoretical principles, it is in perfect conformity with that sense called *common* precisely because it is so *rare*.

The president of a republic is the attorney, elected by the citizens to administer for a certain period, under prescribed rules established by the constitution, their foreign and interior affairs. If we find a person who performs the duties imposed upon him with remarkable ability and honesty, as we Mexican citizens believe that a man of that kind cannot be very easily found, we renew our power of attorney for another four years, leaving intact the most severe maxims of republicanism.

This custom of changing as little as possible those public officers who for the performance of their duties require a certain amount of technical instruction and experience is very old in Mexico. Even in the times when political parties waged terrible war upon each other, causing frequent changes of administration,

many officers who for their competency and honesty seemed to all to be the right men in the right places were left undisturbed.

If we entertain an elevated opinion of General Diaz we only agree with what the press of every country, from Russia to Spain and from Cape Horn to Washington, declare when they assert that Mexico is one of the most prosperous and best governed countries in the world.

Our constitutional laws differ from those of the United States in denying the right to religious corporations of any denomination to possess or administer or to hold any mortgage upon real estate. In consequence the property of such corporation must be in cash or in shares of railroad, telegraph, manufacturing, mining, or some other kind of enterprise which keeps their money in constant circulation. The object of this legislation was to prevent the stagnation of real estate constantly produced by those corporations having two characteristics—indefinite duration and possession in common—not any of their members being able to dispose of any part of the property, as is the case in mercantile associations.

Another point worthy of mention is the disposition of our fundamental laws relative to marriage. Our legislators considered marriage as the corner-stone of the social edifice, and consequently they did not leave it to the legislatures of the States, but prescribed precise and ineludible rules as to its nature and form of contract.

In short, they considered marriage a civil contract constituted by the indissoluble union of a single man to a single woman, and requiring for its legal validity that it be contracted before a civil magistrate appointed for the purpose. Of course, the laws do not prevent the contracting parties from having recourse to the ministers of their religious creed, and this is the reason why in Mexico all nuptial ceremonies are double—one of a religious and the other of a civil character.

Some lawyers say "that it is not convenient to hinder or make marriage a little difficult;" but others answer in reply, "that it is better to oblige men and women to practice the known proverb, 'Look before you leap,' or, as we say in Spanish, '*Antes que te cases, mira lo que haces*' (Before you get married, think of what you are doing)." Divorce is absolutely rejected, though legal separation is allowed, with the formalities prescribed by said laws.

The public administration of Mexico is divided into seven departments: Foreign Affairs; the Interior; Justice and Public Education; Improvements, Industry, Commerce and Colonization; Communications and Public Works; Finance and Public Credit; and War and Navy.

The Department of Foreign Affairs maintains amicable relations with all the countries of both hemispheres. Today Mexico has not a single cause of disagreement with any power or people in the world.

One of the principal objects of the Department of the Interior is to cultivate cordial relations between the Federal and State authorities. There was a time when almost every State governor conscientiously believed it to be his duty to oppose in every way the Federal Executive, and even some of them maintained a large military force, not to keep peace and give public security, but in order to resist by force, if necessary, the orders of the Federal Executive. Those narrow-minded and anarchical ideas are things of the past, and General Diaz, in his last report, relates with patriotic pleasure "that not a single State has any difficulty or displeasure with the Federal authorities or with any of its neighboring States, and that all their governors try to act in perfect accord with the Federal Executive to give an impulse to the continual progress of the

whole country." In other words, they are sufficiently enlightened to avail themselves of the reasonable liberty given by the constitution to administer their internal affairs, and remember that they are only members of that great body called the Mexican Republic, the only sovereign in the true and correct sense of the word.

The board of health is a branch of this department, and the Federal Executive and all the States devote to it special attention. In the City of Mexico a general hospital will be completed very soon, where 22 isolated pavilions have already been finished and where more than 600 patients can be commodiously, hygienically, and scientifically cared for.

The States have followed this example, and many of them have finished or have in actual construction similar institutions based upon the same scientific principles.

The efficacy of the measures taken by the board of health in regard to vaccination and the prevention of smallpox has received the amplest confirmation from experience. In 1898 an epidemic of smallpox broke out in different parts of the country and in the City of Mexico. The total number of deaths was only 78, the great majority being foreigners, who had not taken the precaution of being revaccinated.

We have another institution in excellent condition in the Federal district; that is the police. The whole force is divided in two large sections—the city or urban and the country or rural police.

The greater part of the first consist of footmen, with a small squadron of mounted police, while the second or rural police is exclusively composed of mounted men.

The distribution of the city police is, in the opinion of many natives and foreigners, perfectly organized for public protection. There is always a policeman stationed at the crossing of every street and avenue, and misdemeanors and crimes can often be prevented and the criminals almost always caught. In general, the policemen are courteous and ready, not only to help when called, but to give any information about streets and public buildings—in a word, to be useful to everybody. The services rendered are entirely gratuitous, and many persons, especially foreigners, who with the best intention have tried to give them a voluntary reward for the recovery of lost goods, can testify that the reward has never been accepted in any form. General Diaz in his last report makes the important observation that well-made statistical tables prove that it is not criminality that has increased, but rather the efficiency of the police.

The rural police, who guard the roads of the country in general, are formed exclusively by mounted men picked from the best riders of the Republic and are mounted on splendid horses. This force, by reason of their efficiency and beautiful appearance, always attract the attention of the spectators.

Places for the correction and punishment of criminals, or penitentiaries, are being built throughout the Republic according to the systems proven best by experience, and are all founded upon the philosophical and truly Christian idea that society, when it takes hold of a criminal, does not intend to wreak vengeance on him, but to prevent him from repeating his offensive acts and to reform and convert him by every possible means into a good and honest citizen, and, at the same time, to deter others from following his example.

Let us now glance briefly over two of the most important foundations of any society, and, more especially, of a Republic—the department of justice and public education.

The Federal and State authorities are continually trying to perfect the administration of justice and to elect able and honest citizens to the judgeships. Our

constitution, like yours, decrees that the judicial authorities must be elected by popular vote, and these elections are held in the most tranquil way. My own personal opinion is against this manner of appointing judges and magistrates, as I do not think popularity is always the best qualification for the sacred duties of a judge.

The importance of public education is fully appreciated by the Federal and State authorities, and there is a complete system derived from the study by competent persons of the methods followed in foreign countries. The Federal government has not only adopted the systems considered the best, but has appointed boards of education to give to public education an impetus in the right direction and to make it uniform in the Republic.

In 1898 the number of schools in the Republic was 12,358, and of this number 6,738 were supported by Federal and State authorities, 2,953 by municipalities, and 2,667 by private parties. The average monthly attendance of pupils was 556,009. The expense of the established schools supported by the authorities amounted to $5,980,180.72, not including the schools kept by private parties, of which I have no information. If we take as a point of comparison the cost of the schools paid by the authorities, we can calculate very approximately that $7,000,000 were expended for public education in Mexico in that year. The number of schools for girls was 3,296; for boys, 6,813, and mixed, 2,249. This total has certainly increased since then.

The attendance of pupils increases very rapidly year after year, and I was agreeably surprised, when visiting my country after an absence of many years, to observe the wonderful results attained by our educational system. There is yet much to be done, but what has been already accomplished is truly surprising, and the board of education is continually improving and multiplying the means of instruction.

To make good teachers and to impress unity of method there are normal schools for men and women. In the normal school for women in the City of Mexico there are actually more than 1,600 girls who want to adopt the noble profession of teachers. Another excellent normal school exists in the State of Vera Cruz, and there are others in other States, but I have no data at hand concerning them.

For professional instruction there are, principally in the Federal districts, schools of jurisprudence, engineering in all its branches, commerce, agriculture, arts and trades, fine arts, one conservatory of music, and for all avocations required by the actual state of sciences and arts, and the government is continually giving to each one of them all means conducive to perfect instruction, beginning with a comfortable and hygienic building. The one, for instance, in use by the school of arts and trades for women has been extended because the actual attendance is more than 1,000.

The number of public libraries in 1898 was 130. The national library of the capital last year added to its catalogue nearly 10,000 volumes by purchase and 9,500 volumes by the donation of Mrs. Ysabel Pesado de Mier, widow of our late and lamented minister to the French Republic, Mr. Antonio de Mier y Celis, my dear friend, and one of the best and most patriotic citizens Mexico has ever produced.

The number of museums in the Republic is about 30. The National Museum of the capital, the richest of all, received last year valuable additions in the acquisition of a collection of archæological pieces from the State of Michoacan, a collection of antique objects from the Isthmus of Tehuantepec, and fac-similes of the codices existing in the European libraries relative to our history, donated

by the Bishop of Tehuantepec and the Duc de Loubat.

The newspapers published during that year numbered 533, and of that total 153 were published in the City of Mexico, among them being daily, weekly, monthly, and quarterly journals. Very few, fortunately, were exclusively given to politics, the rest to the exposition and discussion of science, industry, commerce, agriculture, jurisprudence, medicine, political economy, mining and civil engineering, military art, etc.

These few facts, rapidly enumerated, will give some idea of the real state of the public education in Mexico.

Passing to our Department of Improvements, Commerce, and Industry, etc., our mining industry is the most important in every respect and deserves to be mentioned first. The number of mineral properties at the end of last year was 12,304, covering an area of 128,380 hectares, the equivalent of nearly 320,000 acres, besides six extensive zones in the States of Sonora, Chihuahua, and Michoacan and in the territory of Lower California, which were rented to parties under contracts made by the Executive and approved by the Federal Congress for the working of all mines that may be discovered in these tracts of land.

The yield of our silver mines in the four years from 1892 to 1896 was $225,247,459, or a yearly average of $56,311,864. During the four years 1896–1900 the production was $274,370,157, a yearly average of $68,592,540. Our production of gold is also increasing. From 1892–1896 it was $14,123,876, and from 1896–1900, $31,108,425—that is, the output more than doubled during the last four years.

In the production of silver from 1899 to 1900 there was a decline of more than two millions of dollars, but General Diaz explains the cause very satisfactorily by recalling the instability of production, which is subject to many accidents and unforeseen circumstances that diminish or stop suddenly the output of a silver mine. Our mining enterprises are not now confined to silver and gold, but in the mining of many other metals, such as copper, antimony, lead, and mercury, large capital is employed.

Our exports of copper in the last financial year amounted to nearly ten millions of dollars. Some of our mineral-melting establishments have disposed of the following quantities:

Campañía Metalurgica Mexicana de San Luis Potosí, from December, 1896, to September 30, 1900, 332,358 tons.

Gran Fundición Central de Aguascalientes, from December, 1896, to October, 1900, 625,855 tons.

Compañía del "Boleo" baja California, in the years from 1896 to the end of 1899, 40,422 tons.

A department of vital importance to us is that of colonization. Formerly the government made some efforts in this direction, and we now have 29 colonies in steady progress, 13 established directly by the government and 16 by private companies. Experience has taught us, however, that it is better to leave this matter to private enterprises, and the only positive aid given by the government is the tranquillity, security, and incessant and rapid progress of the whole Republic. When these advantageous conditions become universally known the current of immigration will flow into Mexico, where nobody can starve, where the poorest, with some exertion, can arrive at a comfortable situation—the middle class become rich and the rich can increase their capital by millions; and all this with a beautiful climate, salubrious everywhere, except on the coasts, and among a peaceful, industrious people, who have well earned the reputation of being one of the most courteous and hospitable upon the face of the earth.

(*To be continued in the May number*)

GEOGRAPHIC NOTES

OFFICIAL INFORMATION RELATING TO THE PHILIPPINES

THE State Department has recently published three handsome volumes on the Philippine Islands. The first two volumes are a history of Spanish work in the archipelago, with a cyclopedic statement of the resources of the islands. The different peoples, their means of livelihood, their customs, and character are sympathetically portrayed by the editors, Rev. José Algué and the Jesuit Fathers of Manila. The third volume is an atlas of about 60 colored maps. This atlas is the most comprehensive statement of what is known of the geography of the islands ever published. The collection of the material has been the work of generations of the Jesuits, but under the Spanish régime want of money had prevented the publication of the mass of facts obtained. The map-makers of the U. S. Coast and Geodetic Survey have systematized the material which the Jesuits supplied. Volumes I and II are in Spanish and illustrated with very good pictures. The set of three volumes may be obtained from the State Department by the payment of $20.

The Reports of the Taft Philippine Commission, which form a volume of 600 pages, may now be obtained from the State Department gratis.

The War Department has recently issued a large map of Luzon on the scale of 10 miles to the inch. It embodies all the latest information received by the department from its officers and agents in the islands. The department has also printed a third and revised edition of the large map of the archipelago based on the map of Montero Y. Gay, first published in Madrid.

The latest edition of the "Progress Map of Signal Corps Telegraph Lines and Cables" in the Philippines shows all lines laid by the corps up to February 1, 1901. The lower half of Luzon is now covered with a network of wire, while two trunk lines penetrate to the extreme north end of the island. The islands of Panay, Cebu, Negros, Leyte, and Bohol each have several hundreds of miles of wire, constructed by the corps, and are connected by military cables. There are now in operation in the islands 9,000 miles of wire and 400 miles of cable.

These maps may be obtained by responsible persons gratis.

THE CENSUS OF INDIA

THE census of India, taken March 1, 1901, gives the population of that vast country as 294,266,000, an actual increase of only 1.49 per cent during ten years, while during the preceding decade the increase was 11.2 per cent.

The population in 1891 was 287,717,000, but as certain tracts are included in the census of 1901 that were not enumerated in 1891, the net increase is only 4,283,069. In numbers India has thus added to her population less than one-third of what the United States have gained, though the former has four times the population of the latter—an increase of four millions as against thirteen millions for the United States.

The reasons of this small increase in the figures are two: first, the terrible ravages of the plague for four consecutive years in the Bombay Presidency and the two great famines of 1896–'97 and 1899–1900, and, second, the greater accuracy with which the work of the census has been performed.

The population of British India has increased considerably, while in the Native States it has fallen off. British

India now numbers 231,085,000 against 221,266,000 in 1891, and the Native States, 63,181,000 against 66,050,000 in 1891. It is yet too early to analyze the returns for the Native States, but there would appear to be an excessive decline in the birth rate.

The following table gives the population in thousands, the third column showing the percentage of increase or decrease:

British Territory.	1901.	1891.	Percentage.
Ajmere-Marwar	476	542	— 12.17
Assam	6,122	5,433	+ 12.67
Bengal	74,713	71,346	+ 4.72
Berar	1,491	2,897	— 4.99
Bombay	15,330	15,957	— 3.93
Sind	3,212	2,871	+ 11.88
Aden	41	44	— 6.48
Upper Burma	3,749	3,362	+ 14.49
Lower Burma	5,371	4,408	+ 21.84
Central provinces	9,845	10,784	— 8 71
Coorg	170	173	+ 4.28
Madras	38,208	35,630	+ 7.24
Northwest provinces	34,812	34,253	+ 1.63
Oudh	12,884	12,650	+ 2.40
Punjab	22,449	20,766	+ 7.58
Baluchistan	810	*	*
Andamans	24	15	+ 56.95
Total	231,085	221,266	+ 4 44
Native States.			
Haidarabad	11,174	11,537	— 3 14
Baroda	1,956	2,415	— 19.23
Mysore	5,538	4,943	+ 12.
Kashmir	2,906	2,543	+ 14.24
Rajputana	9,841	12,016	— 18.1
Central India	8,501	10,318	— 17.5
Bombay	6,891	8,059	— 14.49
Madras	4,190	3,700	+ 13.23
Central provinces	1,983	2,160	— 8.19
Bengal	3,735	3,296	+ 13.33
Northwest provinces	799	792	+ .91
Punjab	4,438	4,263	+ 4.12
Burma	1,228	*	*
Total Native States	63,181	66,050	— 4.34
Total all India	294,266	287,317	+ 2.42

* No comparison possible.

GEN. FOSTER ON MEXICO

HON. JOHN W. FOSTER has been contributing to the *New York Tribune* a series of very pointed papers on the condition of Mexico of today. General Foster began his distinguished diplomatic career in 1873 as the United States Minister to Mexico, where he represented his nation for seven years. Until this winter he had not revisited the country in the twenty years since his recall. In the meantime he has been the United States minister to the courts of Russia and Spain, and held the highest diplomatic office in the United States, that of Secretary of State.

Instead of geographic isolation, Mexico is now bound to the United States by the iron ties of four railroads, while many steamship lines ply between Vera Cruz and foreign ports. Security of life and property is now assured. The evidences of progress and prosperity are seen on every hand. Mexico, the capital city, has doubled in numbers, and in its conveniences and wealth-bringing attractions may vie with the great cities of the continent.

In its foreign relations Mexico has risen to a position of dignity and gained the respect of all nations. "A marked feature of the recent diplomatic relations of Mexico has been the extension of these relations to the Far East. Several years ago a treaty of amity and commerce was effected with Japan, and missions are now maintained at the two capitals of both governments. Last year a similar treaty of a very liberal character was signed at Washington by the Mexican Ambassador and the Chinese Minister. By it Chinese laborers are admitted into the country, and they are already coming, especially to the Pacific Coast, in considerable numbers, and by their industrious and persistent habits are making themselves felt as an important element of the country."

To the able management of affairs by

President Diaz Mr. Foster attributed the prosperity of the country. The result of the President's good judgment is especially evident in the present confidence in the financial condition of the country, both official and private. "The revenues which before (the election of General Diaz) had been barely $20,000,000 annually, soon doubled, then trebled, and within ten years had increased more than sixfold, reaching as high as $120,000,000."

This increase made possible the abandonment of the old system of taxation of goods passing from state to state and of taxes collected at the city gates on all articles of consumption entering the city. By this reduction in the branches of taxation the national revenues have diminished to $60,000,000, which is sufficient for all the current needs of the government, and yields a surplus to be expended for special purposes.

The entire indebtedness of the Republic amounts to about $177,178,000, borne by about 13,570,000 souls. Mexico's debt *per capita* is thus only $13, while that of Canada is $71.

EXPLORATION DURING VICTORIA'S REIGN

A PERUSAL of Gen. A. W. Greely's able article shows that nearly all the enormous advances in geographic knowledge during the past 100 years were made during Queen Victoria's reign. In 1837 Livingstone was attending medical and Greek classes in Glasgow, and Stanley had not been born. Victoria had reigned 16 years before McClure, in 1853, attained the Northwest Passage, and 43 years before Nordenskjold, in 1880, solved the problem of the Northeast Passage. Sir James Ross, Wilkes, Weddell, and D'Urville all won their Antarctic laurels within her reign. Australia was not crossed from north to south by Stuart till 1862, 25 years after her accession, and from east to west by Colonel Warburton till 1873, 36 years after her accession. Huc, the explorer of Tibet; Pumpelly and Richthofen, pioneers in China, and Nevelskoy, who ascended the Amur from the sea, gained their fame within Victoria's reign. Frémont, Powell, Dall—names illustrious in the exploration of the American continent—also did their work since 1837.

From her accession Victoria was Patron of the Royal Geographical Society, and to her encouragement are due many of the great enterprises planned and successfully carried out by the Society. She was ready also to reward the work of British explorers. James Ross, Leopold McClintock, John Franklin, Samuel Baker, Robert Schomburgk, Henry M. Stanley, and others, she knighted in recognition of their achievements. The Founder's Medal and the Patron's Medal, awarded annually by the Royal Geographical Society, were granted by her.

PHENOMENAL INCREASE IN POPULATION OF ITALY

THE population of Italy has practically doubled in the last twenty-years, a rate of increase that surpasses that of all nations of Europe and even the United States. This, too, notwithstanding the burdens of excessive taxation, that would tend to diminish the birth rate. The last census was taken twenty years ago, in 1881, and showed a population of 21,000,000. According to the census taken early this year the population now numbers 35,000,000. It is safe to estimate the number of emigrants during the twenty years as at least 5,000,000, so that the increase by birth has been about 20,000,000. It has taken the United States thirty years, aided by 12,000,000 immigrants, to double its numbers.

U. S. COAST AND GEODETIC SURVEY

FIFTEEN young Filipinos will soon be selected by civil service examinations in Manila as aids in the U. S. Coast and Geodetic Survey. They will probably be brought to the United States for a preliminary training at the head office in Washington before being assigned to active work in charting the rivers and harbors of the islands. They will be paid $720 a year, a very generous salary in the Philippines, and clever young Filipinos will undoubtedly be secured. The experiment, initiated by Dr. O. H. Tittmann, superintendent of the Survey, is of great importance, as it is the first step to interest, train, and identify the young Filipino in the scientific development of his country.

The coast of southeastern Alaska has been well charted by parties of the Survey during the past several years, but the approaches to this section have remained unmapped. This summer the *Pathfinder* and *McArthur*, in charge respectively of J. J. Gilbert and F. Westdale, will carry survey parties to these channels and soundings will be taken to accurately determine them. A large party will work in Prince William Sound, while several vessels will carry other men westward to tackle the difficult problem of charting the many channels between the Fox Islands of the Aleutian archipelago.

GLACIAL ACTION IN AUSTRALIA

THE evidences of glacial action in Australia during Permo-Carboniferous times are discussed by Professor Penck in the *Zeitschrift* of the Berlin Gessellschaft für Erdkunde, and compared with traces of simultaneous action in India and South Africa. The hypothesis of a shifting of the South Pole to a central point on the tropic of Capricorn, in longitude 86° E., does not satisfactorily account for the geological facts and the existence of glacial conditions over such an enormous area. Professor Penck is quoted in *Nature* as saying that the appearances ascribed to ice action present in each case certain features not characteristic of ordinary glacial deposits; the deposits are stratified and the pebbles are faceted in the manner first described by Wynne. He further observes that the Gondwana beds, always closely associated with these boulder deposits, have lately been found in the Argentine Republic, and he compares the bedding and faceting with conditions induced by pressure observed in the Nagelfluh and in certain localities near Vienna. While many of the observed facts appear to indicate glacial action, still he thinks that these special points demand investigation.

THE NORTHWEST BOUNDARY

IT is well known that the boundary between the British possessions in North America and the United States, from the Lake of the Woods westward to the Pacific Ocean, was long a matter of dispute. Every one knows, too, that after the controversy had given rise to threats of war the 49th parallel was agreed upon by both governments as the dividing line. So, as represented upon the map, the whole question seems settled. Nevertheless there are many persons along this line to whom nothing indicates whether they are living in the territory of the King or of the Union. During 1872–'76 a joint commission erected 388 boundary monuments along the line about two miles apart, but they hardly proceeded farther west than the Rocky Mountains, and left the 410 miles between the mountains and the Strait of Georgia almost unmarked. To survey

and mark out this far northwest boundary an expedition is now being organized by the Geological Survey, at the direction of the State Department. It is probable that the Canadian authorities will coöperate with the Americans in definitely indicating the exact boundary. Much of this region is still without roads and trails. The work will be difficult, as it must be prosecuted in part through the wildest region of the Rockies and Cascades, where impassable streams and lofty cliffs make direct advance impossible. The necessary surveys will require three or four years.

After the work is completed it must be approved by a treaty between the British and American governments, describing in detail the location of this part of the northwest boundary and the monuments by which it is indicated.

Mr. E. C. Barnard, the well-known topographer of the U. S. Geological Survey, will run the line, in coöperation with Mr. C. H. Sinclair, of the Coast and Geodetic Survey. Messrs. Bailey Willis, F. L. Ransom, and G. O. Smith accompany the party as geologists to study the geology of the country in the vicinity of the dividing line.

SUSPENSION RAILROAD IN GERMANY

A SUSPENSION railroad of novel construction has recently been opened at Elberfeld, in Germany. It is about eight miles in length and runs through the towns of Barmen and Elberfeld, following the course of the river Wupper. The up-and-down lines have only a single rail apiece, supported by an iron framework of a kind hitherto unknown in railroad engineering. Each car hangs from two supports 25 feet apart, fitted with double wheels, which run upon the overhead rail. These supports are so shaped that it is believed to be impossible for them to leave the line, even though an axle or a wheel should break.

The motive power is electricity, supplied by a wire attached to the rail. Each pair of wheels is operated by an electric motor controlled by a motorman in the front car. The railroad is the invention of the late Herr Eugene Langer, of Cologne, who died in 1895. The chief advantage claimed is cheapness of construction, for the line can be built over public roads and rivers, where no ground need be purchased.

CAPE TO CAIRO TELEGRAPH

WORK is progressing on the telegraph line from Cairo to the Cape, although little has been heard about it of late, owing to the war in South Africa and the great distance from civilization the engineers have penetrated. The line of poles and wire now stretches 3,000 miles up from the Cape to a point 50 miles north of the town of Kasanga, on the shore of Tanganyika, in German East Africa. Only 1,200 miles remain between Kasanga and the southern end of the Egyptian telegraph line. This last link will be traversed more easily, as the apparatus and supplies can be brought by water instead of by native porters. Porters have to be continually engaged, as the men refuse to go more than a few hundred miles from their homes. Horses, mules, and cattle cannot be employed, as they cannot survive the bite of the tsetse fly.

The country just traversed between Lake Tanganyika and Salisbury is the hardest bit of ground to be met with, for it is mountainous, heavily wooded, and malarious. Mr. E. S. Grogan, the explorer, reports having seen engineers supervising the work from litters while racked with fever and the thermometer standing at 104°.

The rinderpest and the war with the

Matabeles which followed also delayed the work. The Matabeles misunderstood the white man's motive in killing their apparently well cattle, but which were really infected with the disease, and in revenge tore down miles of telegraph poles and melted his wire into bullets, which they fired back at him. In this war $200,000 worth of the company's supplies were destroyed.

They have had less trouble than was expected from wild animals; sometimes, to be sure, elephants have knocked down the poles, and once a lion helped himself to several natives before he was killed.

GERMAN SUBMARINE CABLE SYSTEM

A VAST system of submarine cables is being projected by Germany. In October, 1900, a line was opened connecting Kiaochau with Chifu, and the southern end is now being rapidly extended to Shanghai and Canton. Later a branch cable will be laid from Kiaochau to Nagasaki to connect with the American Pacific cable, which is destined to be soon constructed, while the main cable will be continued to Manila, Sumatra, Borneo, New Guinea, and the Caroline Islands. From the Azores a line will be laid southward to the Cape Verde Islands, thence down the Atlantic to the South American continent to Bahia, Rio de Janeiro, and Montevideo.

On the other side of the Atlantic a German cable will unite Morocco, Guinea, the Kameruns, and German Southwest Africa. When the construction of the system has been completed, the German Emperor will be able to communicate with his possessions in every quarter of the world independent of English lines. His messages will cross the Pacific and American continent on American cables and the Atlantic on the German New York-Azores-Emden line, completed last year.

GREAT BRITAIN IN THE YANGTZE VALLEY

NOTHING is more noticeable than the decay of British influence in southern China during the last five years. It is not merely that British influence has declined, but that the influence of other powers has largely developed in a region supposed to be distinctively the British sphere. Says the Shanghai correspondent of the *Times* in a recent letter: "The Yangtze is steadily growing less and less English and more and more international." He fortifies this statement by discouraging facts observed in Shanghai and Hankau, "the key of the Upper Yangtze." He says: "The one advantage we still possess over the other powers in the Yangtze Valley is the confidence and good will of the better classes among the peoples and officials of central China." But he concludes: "British influence in the Yangtze Valley, as in the rest of China, is, relatively to that of other nations, not an increasing but a steadily and rapidly diminishing quantity."

Sir Archibald Geikie, who retired in March from the head of the British Geological Survey, was born in Edinburgh sixty-six years ago. His whole life has been spent in geologic work. When barely thirty he was appointed Director of the Scottish Geological Survey, and later held the chair of geology in Edinburgh University. In 1881 he was chosen Director General of the Geological Survey of the United Kingdom, and ten years later was knighted in appreciation of his work. James Geikie, whose name is perhaps better known in America, is the younger brother of Sir Archibald. J. J. Harris Teall, the well-known writer on geological subjects, has succeeded Sir Archibald Geikie as Director General of the British Geological Survey.

An Austro-Hungarian floating exposition leaves Trieste in May for a fifteen months' voyage around the world. It is deemed impracticable for more than one ship to take part in the enterprise, as the trip is an experiment. New York, San Francisco, Yokohama, Shanghai, Singapore, Batavia, Calcutta, Madras, Aden, and Suez will be visited. Firms that send exhibits are charged $1,000 for each person and $200 for every cubic meter of space or per ton weight.

U. S. Weather Bureau.—After July of this year the number of forecast districts of the U. S. Weather Bureau will be increased by the addition of Boston, Galveston, and Denver as centers of new districts. The United States is now divided into four districts, each with a center, at which the forecast for that particular district is made. These centers are San Francisco, Portland, Oregon, Chicago, and Washington. By the division into smaller districts greater efficiency will be attained.

An Earthquake Occurred in Spain on February 10, which did considerable damage in Grazalema, a town of 10,000 inhabitants situated in a hilly district of the province of Cadiz, about 70 kilometers, nearly due north, from Gibraltar. Several large buildings, factories, and mills, as well as the church of St. Joseph, were severely injured. Señor Augusto Arcimis, writing to *Nature* from the Central Meteorological Institute of Madrid, says that the body of water that provided motive power for the machinery in one of the factories has disappeared.

British Yukon Telegraph.—It has been stated with apparent certainty that the two British parties constructing the telegraph line from Quesnelle to Atlin, who are working toward each other, the first from Quesnelle northward and the second from Atlin southward, at the halfway point, instead of meeting, found themselves on opposite sides of an impassable mountain range, sixty miles across. Atlin connects with the United States lines uniting Cape Nome, Dawson, and the military posts of Alaska, while from Quesnelle wires run to the great continental systems.

In Jamaica an African Language is still spoken among the Maroons, the descendants of wild negroes who escaped from slavery during the early days of the slave trade. According to Maj. J. W. Powell, of the Bureau of American Ethnology, this language belongs to the Kongo region. The Maroons of Jamaica seem to be in a barbarous or semi-civilized condition, resembling in this respect our North American Indians, and, like the Amerinds, they are confined to reservations, where they still preserve many of the customs and traditions of their savage ancestors.

The Recent Census of Vienna shows that in Austria, as in Germany, there is taking place a very rapid increase in city populations, due in large part to immigration from the rural districts. Vienna has now 1,635,647 inhabitants, and has increased in population during the past ten years 21.9 per cent. Vienna now ranks fourth among the European capitals, London, Paris, and Berlin exceeding her. London and Berlin are increasing at a faster rate. Of American cities, New York and Chicago outrank Vienna in numbers, and each is increasing more rapidly—New York 37.8 per cent, and Chicago 54.4 per cent, in ten years.

The U. S. Board on Geographic Names held no meeting during March. By act of Congress a second edition is being printed of the volume containing all the decisions of the Board up to January 1, 1900. Copies of the report may be obtained by applying to Marcus Baker, secretary of the Board, U. S. Geological Survey, Washington, D. C.

GEOGRAPHIC LITERATURE

Newest England. By Henry Demarest Lloyd. Illustrated. 8vo., pp. 387. New York: Doubleday and Page.

Mr. Lloyd ably traces the development of those forces in New Zealand which have given pensions to the old and have made government monopolies of life and accident insurance, and also of railways and telegraphs. He describes the government and people as "the least bad this side of Mars"—*i. e.*, they are not perfect, but no others are as good. The relatively enormous public debt, $300 for each man, woman, or child, a *per capita* debt which in this country would amount to twenty-two billion dollars, and the consequently decreasing birth rate are two grave facts which Mr. Lloyd overlooks.

An Old Indian Village. By Johan August Udden. Augustana Library Publications, No. 2. Rock Island, Illinois, 1900.

Although the author of this interesting brochure lays no claim to special skill in archæology, his work may well serve as a model to local archæologists throughout the great area covered by the Mississippi drainage system.

The scene of the explorations conducted by Professor Udden at intervals during seven years from 1881 is Paint Creek valley, a mile and a half south of Smoky Hill River, in McPherson County, Kansas. The village remains consisted of fifteen low circular mounds from twenty to twenty-five feet in diameter, without particular order of arrangement and covering an area of about twenty acres. The average height of the mounds is about two feet, while some rise only very slightly above the surface of the prairie.

Excavation revealed axes, hammers, polishers, metates, manos, flakers, pipes, knives, and scrapers of stone, and awls, hoes, beads, gouges, and other objects of bone. Bones of numerous animals, fishes, and the wild turkey, as well as the valves of fresh-water clams, were also found during the excavations, indicating that the former occupants of the site gained a livelihood by hunting as well as by agriculture.

Perhaps the most interesting object unearthed from the Paint Creek village—certainly the most interesting from the historical and geographic points of view—is the piece of chain mail illustrated in the volume, but unfortunately since lost. The definite origin of this relic of early Caucasian exploration is not known, but as the field of Professor Udden's researches was unquestionably a part of the Province of Quivira, which the famous expedition of Francisco Vasquez Coronado penetrated in 1541, and which led to similar expeditions into the same locality during the succeeding half century, the relic is in all likelihood of Spanish origin.

The Province of Quivira was inhabited in the sixteenth century by the Wichita Indians, who later occupied an extensive area southward in the present Oklahoma, whence the name of the Wichita Mountains and of Washita River. They were the only Indians of the plains who lived in grass houses (such as Coronado's chroniclers describe as having been seen in the Quivira region), the Pawnees occupying earth lodges, and other plains tribes portable tipis of buffalo hide. We may therefore assume that the Paint Creek village was inhabited by the corn-raising and buffalo-hunting Wichitas, as the relics would seem to show, and probably during the Coronado period, or at any rate during the time of one of the immediately succeeding Spanish expedi-

tions from New Mexico, as the fragment of chain mail tends to prove.

Altogether Professor Udden's work is worthy of high praise. It is regrettable. that "this will be his last as well as his first paper bearing on topics of this kind." F. W. HODGE.

The Romance of the Earth. By A. W. Bickerton. Illustrated. Small 8vo, pp. 181. New York: The Macmillan Co., 1900. $0.80.

As indicated by the title, the author aims to describe the past and present of the earth in the form of a story. The idea and its execution are capital. The author naturally has not adhered strictly to the limits of known science. Where human knowledge can throw no light, he permits himself "to speculate, to make deductions from the accepted laws of nature" in order that no chapters in the romance may be missing. The book is instructive and interesting, and especially valuable to stimulate younger minds to learn more of the great "romance of the earth."

The Philippines—The War and the People. By Albert G. Robinson. Pp. 407. New York. McClure, Phillips & Co. 1901.

The volume consists of letters written by Mr Robinson to the New York *Evening Post* while he was staff correspondent for that journal in the Philippines. Mr Robinson is inclined to believe "that development in the islands would be impossible without the patient, submissive, industrious Chinaman," who is "a sort of necessary evil." The book contains much valuable information about the islands and their people, though it is doubtful if many Americans will agree with the author's pro-Filipino tendencies. Specially interesting chapters are, "The Moros of Mindanao" and "The Moros of Sulu."

PROCEEDINGS OF THE NATIONAL GEOGRAPHIC SOCIETY

Popular Meetings.*

March 1, 1901.—President Graham Bell in the chair. Mr. Gilson Willetts delivered an illustrated address, "The Recent Famine in India."

March 15, 1901.—Vice-President McGee in the chair. Mr. H. L. Bridgman, Secretary of the Peary Arctic Club, and Dr. Frederic A. Cook, of the Belgian Antarctic Expedition, delivered illustrated addresses on "The Two Ends of the Earth—Peary and the North Pole, and The Cruise of the *Belgica* in the Antarctics."

March 29, 1901.—President Graham Bell in the chair. Mr. Alexander Hume Ford delivered an illustrated address, "The Railways and Waterways of the Russian Empire."

* The proceedings of the technical meetings during March will appear in the May number.

Afternoon Meetings.

March 5, 1901.—President Graham Bell in the chair. Talcott Williams, LL. D., delivered an illustrated address, "Western Asia."

March 12, 1901.—President Graham Bell in the chair. Hon. John Barrett delivered an illustrated address, "Eastern Asia—China."

March 22, 1901.—President Graham Bell in the chair. Prof. H. Morse Stephens, of Cornell University, delivered an address, "Southern Asia—India."

March 26, 1901.—President Graham Bell in the chair. Prof. Edwin A. Grosvenor, of Amherst College, delivered an illustrated address, "Northern Asia—Siberia."

April 2, 1901.—President Graham Bell in the chair. Vice-President McGee delivered an illustrated address, "Asia—The Cradle of Humanity."

Announcements.

THE ANNUAL RECEPTION OF THE SOCIETY will be held on Friday evening, April 12, in the parlors of the Arlington hotel. Mr. Paul Du Chaillu will be the guest of honor of the Society and will give some reminiscences of his travels.

A REGULAR MEETING OF THE SOCIETY will be held in the large hall of the Cosmos Club at eight o'clock Friday evening, April 19. All members resident in Washington are urged to attend, as important proposed changes in the by-laws, submitted and recommended by the Board of Managers, will be acted upon.

Object of Proposed Change in By-laws.

The Board of Managers submits and recommends to the Society important amendments to the by-laws. The proposed changes are so numerous that, for the sake of simplicity, the Board offers an entire set of revised by-laws to replace the existing by-laws. Members who wish to note in detail the modifications proposed can do so by comparing the draft which follows with the existing by-laws as printed in the MAGAZINE, Vol. IX, pages 414-416. The general tenor of the changes is set forth in the following paragraphs:

In an address read to the Board of Managers June 1, 1900, and printed in the Magazine for October (Vol. XI, pages 401-408), President Bell advocated various changes in the policy of the Society, for the purpose of making its character more truly national. The revised by-laws now offered embody one of the more radical of these changes.

At the present time the Society has *active members*, residing chiefly in the District of Columbia, and *corresponding members*, residing chiefly in other parts of the United States. The dues of active members are five dollars, of corresponding members two dollars. Both classes receive the Magazine; active members have in addition various other privileges, including that of attending lectures. Thus constituted the Society is not national in its active membership, but only through its corresponding membership. It is now proposed (1) to merge the grades of corresponding member and active member into the single grade of *member*, (2) to fix the dues for all at two dollars, (3) to treat lecture courses, whether in Washington or elsewhere, as local privileges, to be paid for by those who are benefited.

The proposed by-laws include many minor changes which seem to the Board desirable if the general change in organization be adopted. The more important of these are (1) the enlargement of the Board of Managers by the addition of members not residing in the District; (2) the creation of an Executive Committee for the transaction of current business; (3) the restoration of the fiscal year to coincidence with the calendar year; (4) the omission of section 8 of article IV, with reference to Managers who are continuously absent from meetings of the Board.

They include also a number of changes not specially related to the general change in organization. The more important of these are (1) the substitution of the single office of Secretary for the two offices of Recording Secretary and Corresponding Secretary; (2) the omission of the requirement that the Secretary and Treasurer be selected from the Board of Managers; (3) the making more stringent the rules with respect to arrearage of dues; (4) the reduction of the quorum of the Society from 25 to 20; (5) the provision that official notice of proposed amendments to the by-laws may be given through the Magazine.

The amendments will come up for action at the regular meeting to be held April 19.

A. J. HENRY, *Secretary*.

Proposed By-laws.

ARTICLE I.—*Name*.

The name of this Society is *The National Geographic Society*.

ARTICLE II.—*Object*.

The object of the Society is the increase and diffusion of geographic knowledge.

ARTICLE III.—*Membership*.

SECTION 1. The Society shall consist of members and honorary members.

SEC. 2. Members shall be persons interested in geographic science.

SEC. 3. Honorary members shall be persons who have attained eminence by the promotion of geographic science. They shall not be members of the corporation, nor shall they vote or hold office.

SEC. 4. The election of members and honorary members shall be entrusted to the Board of Managers.

ARTICLE IV.—*Officers*.

SECTION 1.—The administration of the Society shall be entrusted to a Board of Managers composed of twenty-four members, eight of whom shall be elected by the Society at each annual meeting, to serve for three years, or until their successors are elected. Of the eight members elected at each annual meeting, not less than four nor more than six shall

be residents of the District of Columbia. A majority of the votes cast shall be necessary for election.

SEC. 2. The Board of Managers shall elect annually from their own number a President and a Vice-President, and shall elect annually a Treasurer and a Secretary.

SEC. 3. The President shall preside at the meetings of the Society and of the Board of Managers, or may delegate this duty. The President and the Secretary shall sign all written contracts and obligations of the Society.

SEC. 4. In the absence of the President his duties shall devolve on the Vice-President.

SEC. 5. The Treasurer shall have charge of the funds of the Society, under the direction of the Board of Managers, and shall make collections and disbursements and render an annual report, and his accounts shall be audited by a committee of the Society, not members of the Board, annually and at such other times as the Board may direct.

SEC. 6. The Secretary shall record the proceedings of the Society and of the Board of Managers, conduct correspondence, and make an annual report.

SEC. 7. The Board of Managers shall fill vacancies arising in the Board.

SEC. 8. All officers shall serve until their successors are chosen.

ARTICLE V.—*Committees.*

SECTION 1. The Board of Managers shall select annually from its own number an Executive Committee.

SEC. 2. There shall be standing committees on Publications, Communications, Admissions, Research, and Finance, whose chairmen shall be members of the Board of Managers. These committees shall be appointed immediately after the annual election of the President to serve until their successors are designated.

SEC. 3. The committees of the Society and of the Board of Managers shall be appointed by the President, except when otherwise provided. The President shall be a member *ex officio* of every committee.

ARTICLE VI.—*Finances.*

SECTION 1. The fiscal year of the Society shall begin on the first day of January.

SEC. 2. The annual dues of members shall be two dollars, payable in January.

SEC. 3. Annual dues may be commuted and life membership acquired by the payment at one time of fifty dollars.

SEC. 4. Members whose dues remain unpaid on March 1 shall be notified by the Treasurer that unless the dues are paid within one month they will be in arrears and not entitled to vote at the annual meeting, to receive the publications of the Society, or to purchase lecture tickets on members' terms. Members one year in arrears shall, after formal notification, be regarded as having withdrawn from the Society.

SEC. 5. The funds of the Society may be invested and loans may be negotiated in the interests of the Society, and any other financial business germane to the purposes of the Society may be transacted by the Board of Managers.

ARTICLE VII.—*Meetings.*

SECTION 1. Regular meetings of the Society shall be held on alternate Fridays from November until May.

SEC. 2. Special meetings may be ordered by the Board of Managers or called by the President.

SEC. 3. The annual meeting shall be held in the District of Columbia on the second Friday in January.

SEC. 4. Twenty members shall constitute a quorum.

SEC. 5. Regular meetings of the Board of Managers shall be held on the same days as the regular meetings of the Society; special meetings may be held at the call of the President or on notice signed by five members of the Board: *Provided*, That for any of its own meetings the Board may substitute meetings of the Executive Committee.

SEC. 6. Lectures and lecture courses may be provided by the Board of Managers. Free admission to such lectures shall not be a prerogative of membership, but tickets shall be sold to members on more favorable terms than to non-members: *Provided*, That each life member who acquired life membership prior to the year 1901 shall be entitled to two admissions to each lecture and course.

ARTICLE VIII.—*Publications.*

The Society shall publish a journal or periodical under the title THE NATIONAL GEOGRAPHIC MAGAZINE, which shall be sent to all members of the Society not in arrears, and may be placed on sale.

ARTICLE IX.—*Amendments.*

These By-Laws may be amended by a two-thirds vote of the members present at any regular meeting, provided the proposed amendments are reported by the Board of Managers, and provided that notice thereof has been sent to all members of the Society not less than ten nor more than sixty days before the meeting. The publication of proposed amendments in THE NATIONAL GEOGRAPHIC MAGAZINE shall be deemed a notice within the meaning of this article.

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